RAILROAD GAZETTE

FRIDAY, JUNE 28, 1901.

CONTENTS

Railroad Telegraph Superintendents.

The twentieth annual convention of the Association of Railway Telegraph Superintendents was held at Buffalo, on June 19, 20 and 21. It was one of the best attended meetings so far held. The meeting was called to order by the president, Mr. W. F. Williams, of Portsmouth, Va. Mr. H. W. Pope, of Buffalo, acting general manager of the Bell Telephone Company, welcomed the delegates to Buffalo, and on behalf of his company gave an invitation to various entertainments.

The report of the treasurer showed that the association was in a prosperous condition. The election of officers resulted in the selection of Mr. C. F. Annett, assistant superintendent of telegraph of the Illinois Central, Chicago, as president, and Mr. F. P. Valentine, superintendent of telephones of the New York, New Haven & Hartford, Boston, as vice-president. Mr. P. W. Drew, of the Wisconsin Central, Milwaukee, was re-elected secretary.

The first paper was that prepared by Mr. Walter P. Phillips, of Bridgeport, Conn., on "Rapid Telegraphy." Mr. Charles Selden, of Baltimore, read an interesting paper on "The Voltaplex," written by the inventor, Mr. H. D. Bartholomew, chief operator at Newark, Ohio. Mr. W. E. Athearn, of the electrical engineer's office, of the Western Union Telegraph Co., New York, read a paper on the application of storage batteries to railroad telegraph service, giving valuable information and statistics bearing on the efficiency, cost and reliability of storage batteries.

Mr. C. S. Rhoads, of Indianapolis, Ind., superintendent of telegraph of the Big Four, read a paper on cipher code for general railroad telegraphing, and after it was discussed a committee was appointed to investigate and report to the next annual meeting. This committee consists of Messrs. Rhoads, C. M. Lewis, of Reading, Pa., and J. H. Jacoby, of South Bethlehem, Pa. It will endeavor to formulate a cipher code that will meet the approval of the American Railway Association. Mr. A. R. Swift, of Chicago, Ill., superintendent of telegraph of the Chicago, Rock Island & Pacific, read a paper on the inefficiency of the ordinary operator.

On Thursday morning Mr. Thomas D. Lockwood, electrical engineer of the American Bell Telephone Co., of Boston, read a paper on the "Importance of Little Things." It contained many valuable suggestions and its discussion was taken part in by almost every member present.

Mr. F. P. Valentine, of Boston, read a paper on "Railroading By Telephone." This paper discussed the progress and development of the telephone in the railroad service during the past few years. He stated that this useful device had become indispensable in all departments of the railroad service, and that every trunk line appreciated its great value.

On Friday, a paper on the usefulness of the telephone in handling trains at terminals was read by the author, Mr. G. N. Clark, superintendent of the Illinois Central at Omaha. He gave a clear illustration of this method of moving trains and furnished samples of the various blank forms which he uses for this purpose.

Mr. Wm. Maver, Jr., electrical engineer, New York, read some notes on the subject of underground cables, discussing the best insulation for various conditions. Dr. G. A. Cardwell, of New York, explained his typo-telegraph, which is now in experimental use on the Long Island Railroad at Long Island City. We expect to give abstracts of the various papers that were read.

The convention will next meet at Boston, June 18, 1902.

. Among the manufacturing and supply firms represented were the following: The Safety Insulated Wire & Cable Co., of New York, by A. P. Eckert; J. H. Bunnell & Co., New York, by W. S. McLaughlin and J. J. Ghegan; the Kellog Switchboard & Supply Co., Chicago, Paul W. Bossert; the Webb C. Ball Co., watch manufacturers of Cleveland, Ohio; the Bunnell Telegraphic & Electrical Co., New York, by H. S. Young, Jr.; the Railroad Supply Co., Chicago, by Eugene W. Vogel. The signal and electrical department of this company handles many kinds of electric signals for railroads, and the company has lately acquired control of several other crossing signal companies, and manufactures all the various signals for these as well as "The Chicago" signal. J. H. Bunnell & Co., 20 Park Place, New York, exhibited a full line of telegraph apparatus. The Bunnell Telegraphic & Electrical Co., of 110-116 Beekman street, New York, and Mr. Jesse H. Bunnell showed samples of telegraph instruments and call boxes.

The Westinghouse Electric Brake and Heater.

This apparatus consists of two distinct elements—the brake and the heater. The brake may be used independently of the heater, but the heater is dependent upon the use of the brake ;the heat produced being derived from energy that would otherwise be wasted.

Description of Brake.

The brake proper comprises a double track shoe combined with a powerful electro-magnet, which, when energized by the car motors acting as generators, is strongly attracted to the rail by magnetic force; brake heads and shoes of the ordinary type, acting directly on the wheels and constituting a wheel brake of maximum power and efficiency, and sundry castings and forgings for simultaneously transmitting the downward pull and resultant drag of the magnetic track brake into lateral pressure upon the wheels.

The combination of these three elements in duplicate, together with the necessary tie-rods and attachments, constitutes a single-truck brake equipment designed for application to a four-wheel, or single-truck, car; a double-truck equipment is required for an eight-wheel car.

In addition to the truck equipment, a complete brake includes brake controller attachments for use when the motor controllers are not provided with braking points, and a diverter, or improved form of rheostat, for dissipating any excess of heat when the heaters are not in service.

Fig. 1 illustrates the arrangement and construction of the apparatus; also the method of attaching the brake rigging to the truck, and of suspending the track shoes and magnet frames. When the brake is not in operation, the suspension springs carry the track magnets and shoes, entirely clear of the rails, and, by means of their flexibility, permit the shoes to ride over any obstruction not sufficient to cause the car to be stopped. When the brake is applied (through the saturation of the magnets with current supplied by the car motors acting as generators) three distinct effects are produced: 1. A noticeable increase in the pressure of the wheels on the track, because of the downward pull of the magnets; 2. A pronounced retardation by reason of the friction generated between the track shoes and rails; 3. A maximum braking effect on the wheels, obtained through the transmission of the resultant drag of the track shoes to the brake shoes.

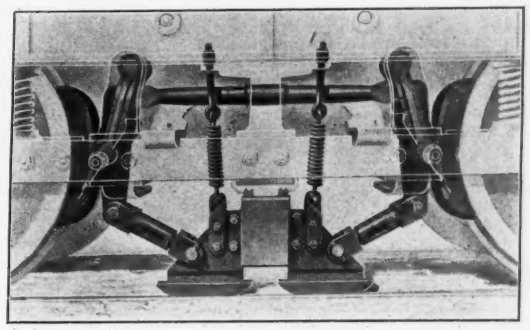


Fig. 1—Westinghouse Magnetic Brake—Transparent View Showing Method of Attaching Brake to Car Frame and Trucks.

The net result of these three effects is a much higher braking power than can be obtained by the use of any other brake without skidding wheels; moreover, the feature of a powerful track brake, which, instead of decreasing the weight upon the rails at the wheels, actually increases it, is as unique as it is valuable, and it is in this feature that this brake differs from all other track brakes. Other forms have proved distinctly inferior because of their tendency to decrease the hold of the wheels upon the rails. It is highly important not to lessen but rather to increase the pressure of the wheels upon the rails in the manner obtained by the magnetic brake.

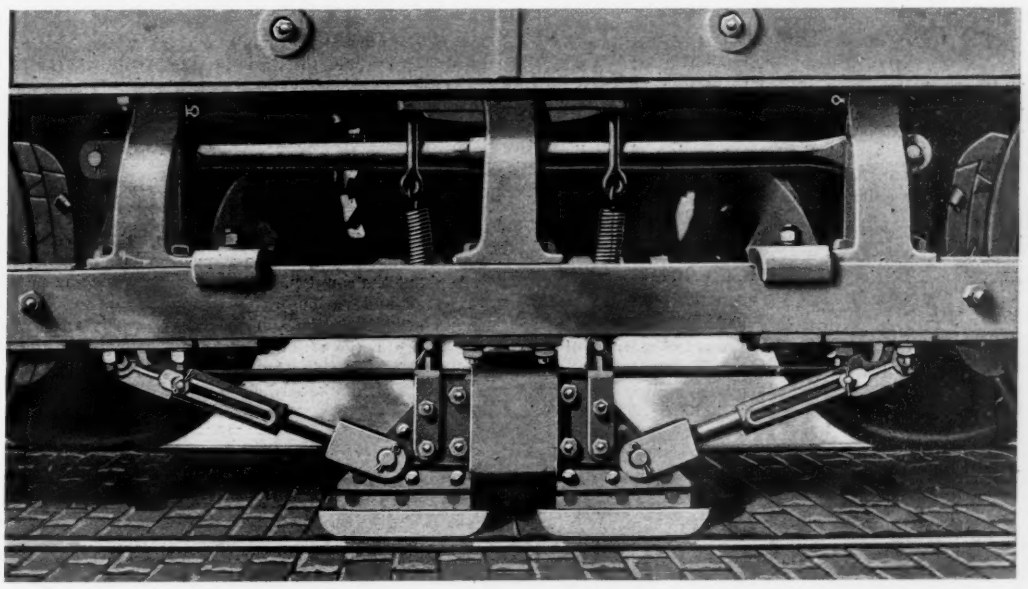


Fig. 3—Westinghouse Magnetic Brake.

Fig. 2 is a view from under the car, at a point midway between the trucks, illustrating the arrangement of the hangers, rods and other parts inside the truck frames. The illustrations are from photographs of different equipments, which accounts for differences in detail.

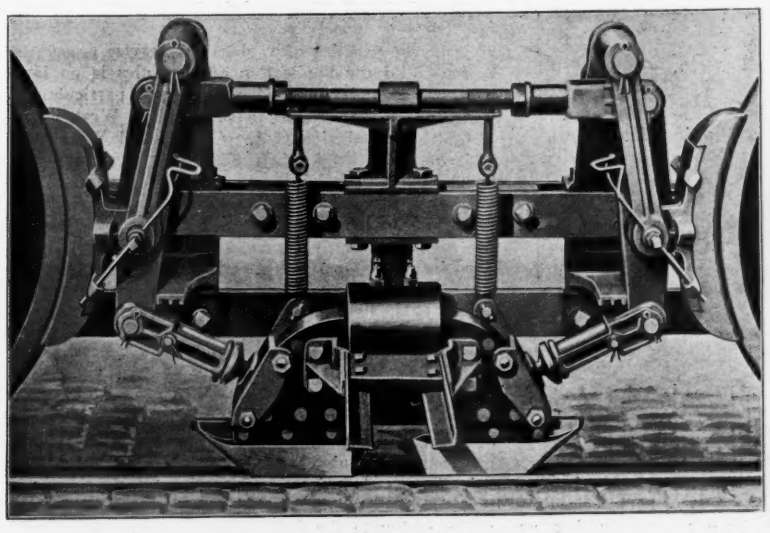


Fig. 2—View of Brake From Under Car at a Point Midway Between the Trucks.

While the thrust against the wheel-brake shoes, caused by the drag of the track shoe is similar to the thrust obtained in the well-known air-brake, the magnetic brake has a decided advantage in that the brake-shoe pressure is automatically regulated by the condition of the rail surface. This is a fortunate feature, which gives the highest braking power at all times without danger of wheel-sliding.

There is another automatic adjustment. As is well

known, when the motion of the car is being rapidly retarded, the forward wheels carry a somewhat greater proportion of the weight resting upon the truck; so that by placing the fixed lower fulcrum of the forward brake-shoe lever slightly above the pin connecting it with the telescope rod, as shown in Fig. 1, a brake-shoe pressure is applied to the forward wheels proportionately greater than that acting upon the rear wheels; when the car is reversed, the governing conditions are also reversed and entirely satisfactory results attained—the levers and connections being so designed that, when properly adjusted, the highest possible braking power is secured, without reference to the direction in which the car moves.

As previously explained, the track magnets are energized by current obtained from the car motors acting as generators, which prevents accident from a failure of line current. The current necessary for magnetizing is uniformly kept within safe limits by a proper adjustment of resistance always in circuit with the brakes.

An additional advantage of the magnetic brake is in using the improved rheostat (which has a constant resistance regardless of the heating produced by a continuous flow of current) in the automatic control of speed on long and steep grades. This is because a certain resistance in the rheostat insures a fixed current flow at a given speed; and this resistance can be readily adjusted so as to permit just enough current to pass through the track-shoe magnets to hold the car at the required speed, against the action of gravity, on any grade. Any increase in speed increases the current, and causes the brakes to act with greater force, while a decrease in speed decreases the current and the brake action at the same time, so that the speed of a car may be automatically regulated within narrow limits regardless of changes in the gradient.

This brake can be readily applied to trail cars by properly attaching the track magnets and accessories to them and connecting the magnetic coils to the wiring of the motor car.

The Heater.

This heater, occupying no valuable space, easily controlled, and costing nothing to operate, has proved its value during the past winter on one of the leading lines of Pittsburgh.

The arrangement is shown in Fig. 4. The heaters are connected with the general system of wiring, by a switch so constructed that the braking and starting currents, both of which are used for heating the car in cold weather, may be divided as desired, and the whole or any portion thereof sent through the heaters, the remainder going through the proper portion of the diverter beneath the car.

Fig. 5 shows the connections of the heaters and rheostats. Whatever portion of the total actual current is flowing through the heaters flows through every section alike, thus heating the car uniformly, no matter how small the amount of heat required.

Ordinary electric car heaters have so small a storage capacity that they are cooled very quickly when the current is interrupted. An important advantage of this heater is its great capacity to store and retain heat; in the event of blockades or the failure of line current the car is kept comfortable for an hour or more, even in severe weather.

The advantages of the combined electric brake and car heater may be summarized as follows: Automatic regulation of braking power and the consequent elimination of slid-flat wheels; non-dependence upon trolley circuit—necessary current furnished by car motors acting as generators; economy, simplicity and certainty of operation; accessibility of all parts; maximum braking effect under all conditions of track; simplicity of construction; automatic control of speed down long and steep grades; brake control of trail cars; heating cars electrically without cost for current.

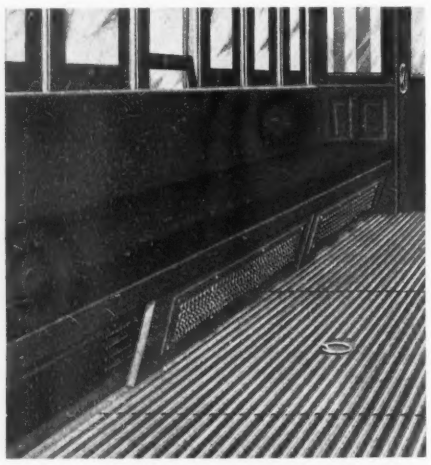


Fig. 4—Interior of Car, Showing Heater.

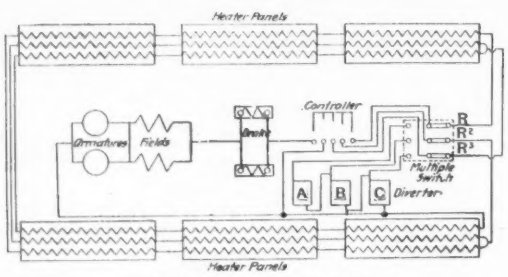


Fig. 5—Diagram of Wiring.

The President of the Master Mechanics' Association.

At the convention this year Mr. Arthur Manning Waitt was promoted from First Vice-President to President of the American Railway Master Mechanics' Association. Mr. Waitt's face and career are so well known to the readers of the *Railroad Gazette* that they are published now rather as a matter of record than for any other reason.

He was born Oct. 24, 1858, at Boston, and was graduated from the Massachusetts Institute of Technology as a Mechanical Engineer. It will be seen that he graduated pretty young, because in 1879 he began the regular railroad work which he has followed ever since. Entering the shops of the Chicago, Burlington & Quincy as draughtsman, he rose gradually through the grades of general draughtsman of the locomotive department of the Eastern road and general foreman of the car department of that road to be Assistant Master Mechanic of the Boston & Maine in 1887. Then, he served for a time as Assistant Manager of the Pullman Car Works; Assistant General Master Car Builder, and at last, General Master Car Builder of the Lake Shore & Michigan Southern. In April, 1899, he was made Superintendent of Motive Power and Rolling Stock of the New York Central & Hudson River Railroad. Our readers have been made fairly familiar with his work there through the numerous examples of it that have been published from time to time in the *Railroad Gazette*. It involves a practical revolution of the motive power and the shop organization and administration.

Car Service Managers' Meeting.

The National Association of Car Service Managers held its annual meeting at Denver, Col., June 18 and 19. The attendance of Managers was quite large, representing four-fifths of the Car Service Associations throughout the country. A number of interesting papers were read and various subjects touching upon different phases of Association work were discussed; and, as in former years, the renewal of acquaintances and the informal talks outside the meetings constituted an important result of the gathering.

The special committee on the Application of Car Service Rules to Export Freight reported that considerable progress has been made during the past year at seaboard terminals in the South, so that nearly if not quite all of these points between New Orleans and Norfolk inclusive, are applying car service rules to export freight which is not on through consignments, unless disposed of within ten days. The railroads north of these points do not appear to have as yet been able to agree upon adopting these rules at export points, except as they are being applied in New York harbor, under the 10-day rule.

The question of refunding car service charges by errors of other roads was left in the hands of the Committee at the Atlantic City meeting last year, with instructions to confer with the car service committee of the American Railway Association; but it was decided advisable not to press the matter any further.

A paper was read by Mr. J. C. Loomis entitled, "Desirability of Uniform Rules on Similar Commodities by all Associations." It was held by the writer that the experience of recent years has shown that the large diversity of practice of various car service associations in regard to the application of the rules is no longer necessary or advisable. This referred particularly to Car Service Associations in the Central West, covered under the jurisdiction of the Central and Western Associations of Car Service officers, running from Pittsburgh and Lake Erie to the Mississippi River points, St. Louis and Peoria. The rules applicable to a given commodity are different in contiguous associations connected with the same roads, and the writer claimed that much of this was unnecessary and might now be eliminated to the great advantage of the railroads, as well as the shipping public. The discussion in opposition to the paper was mainly by Mr. O. G. Fetter, who contended that the diversity in the rules as at present applied was necessary and could not well be changed. Arguments in favor of conformity were made by Messrs. Elliott, Berry, Baker and others, particularly Managers of associations within the territory referred to. The consensus of opinion was that if the rules as they now exist were enforced uniformly alike by all associations the situation would be very much relieved; and that while, owing to the differing conditions, some diversity is probably necessary, yet it need not be nearly so large as it is.

A paper was read by Mr. A. L. Gardner, of Baltimore, on "What is the Real Test of the Efficiency of a Car Service Association." This paper was adopted without discussion. We expect to report it in a future issue.

The other subjects discussed may be summarized as follows:

1. "Can one consignment be legally held for car service due upon a previous shipment." It was the general understanding that a given consignment cannot be held for charges due on a previous shipment, unless by attachment through due process of law. It was stated, however, by Mr. Berry, of Columbus, that counsel of local roads there, was inclined to the opinion that this point might possibly be sustained by the courts; and it is their intention to bring a case up as soon as opportunity presents.

2. (a) "Reported detention, both railroad and consignee, and basis upon which associations compile reports."

(b) "Advisability of exhibiting local conditions when comparing delays of various associations, i. e., whether points covered are local, small junctions or large terminals."

(c) "Should figures from other associations be submitted to the Manager responsible for them before using for comparative purposes?" This subject brought out a general discussion in regard to the methods of reporting detention and accounting, and comparing statistics of various associations. It was the sense of the meeting that such statistics are unfair and of no value, unless the actual conditions governing the territory of each association are known and considered; local customs are so diverse that no comparison can be made.

2. "Inspectors." In quite a number of associations a considerable portion of the time of Inspectors is employed in investigating claims. The view was expressed that this should be done only on rare occasions; the main province of the Inspector is to check up stations and ascertain what agents are doing, and insist, as far as possible, in instructing the clerks and seeing that the rules are properly understood and enforced by the agent and his subordinates.

4. "Refunds; what is their tendency, greater liberality or increased stringency?" This drew from members the general expression that their practice is in line of increased stringency in regard to refunds; particularly on that class of claims resulting from "order shipments." Many associations make no refund on this class of business unless it is proved after investigation that the railroad was in some way responsible for the delay.

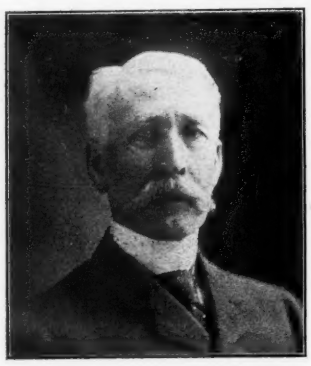
5. "Should more time be allowed for unloading 40-ton and 50-ton cars than smaller ones?" The unanimous opinion of the members was that the present allowance of 48 hours is ample. The 100,000 lbs. capacity cars are mostly coal hoppers, unloaded on dumps; but even this class of cars are being unloaded in some localities on track delivery by shovel and cart and released within 24 hours, so that it is only a question of facilities after all. It was also stated that 60,000 lbs. or 80,000 lbs. in one car should not receive any more time than the same tonnage unloaded from two cars; and that ten or twelve years' experience of the shipping public under car service rules had so transformed and modified facilities that 48 hours is now ample time for unloading cars of any commodity, and that as the railroads have furnished increased facilities, consignees should also improve their facilities correspondingly.

In the election of officers for the ensuing year the present incumbents were all re-elected, namely: President, J. C. Haskell, Atlanta, Ga.; Vice-President, J. C. Loomis, Louisville; Secretary, A. G. Thomason, Scranton, Pa.

The association voted to hold its next annual meeting at Asheville, N. C., in June, 1902, the date to be fixed later by the Executive Committee.

The President of the Master Car Builders' Association.

Mr. John J. Hennessey advances from the office of First Vice-President to that of President of the Master Car Builders' Association. The presidency of this important association is one of the highly valued professional rewards for service in that department, and for zeal in serving the M. C. B. Association itself. Mr. Hennessey's railroad experience has been remarkably fortunate and correspondingly simple; that is, he has spent his working life now for thirty years in one department of one railroad.



He was born in Waukesha County, Wis., in 1847 and entered the service of the Chicago, Milwaukee & St. Paul in 1871 in the shops at Prairie du Chien, Wis. In 1879 he was made Foreman of the shops at Milwaukee, having meantime served at Prairie du Chien, Chicago and Milwaukee. From 1880-1887 he served as Inspector of new car construction at various contract shops, and then for a year served as General Foreman of the West Milwaukee car department shops. In 1888 he became

Master Car Builder of the Chicago, Milwaukee & St. Paul. In the Master Car Builders' Association he has served on various committees, and it goes without saying that he has been an active and influential member.

Richmond Compound Locomotives for the Rio Grande Western.

The Rio Grande Western has received from the Richmond Locomotive Works a number of heavy consolidation locomotives, of which the accompanying engravings show general views. These engines, while not the most powerful that are running, have cylinder dimensions that have not been exceeded and these are such as were declared a few years ago by the opponents of the two-cylinder system of compounding to be impracticable and beyond consideration.

These engines have boilers 74 in. in diam. with a total heating surface of 2,873 sq. ft. The cylinders are 23½ and 36 in. in diam., respectively, with a stroke of 30 in., and this comes very close to the diameter and stroke of the largest cylinders that have been built, which is 24 and 32 in. respectively.

It is interesting in considering such an engine as this, which may fairly be taken to represent the most advanced practice in design and power, to compare some of its dimensions with what was considered an exceedingly heavy engine of three decades ago. Here we have crank-pins with a diameter larger than that of the driving axle journals at that time, and piston rods larger than the crank pins. In fact, the weight has increased almost three-fold and with it, of necessity, the dimensions of the several parts.

The eye has, however, been so gradually educated to these large sizes that such an engine does not seem bulky and it is only when it stands by one of the older and smaller engines that one is impressed with the idea of its true size. The only things that seem to have grown smaller on these modern engines are the headlight, stack and dome. The headlight has been slightly reduced in size and a greater intensity of light obtained, but the stack has shrunk from the bulky wood-burner and the top-heavy diamond of the old coal-burner to an insignificant pipe that hides itself behind the headlight when the engine is viewed from the track ahead. As for the dome it has been crushed between the overhead clearances and the rising top of the shell until all vestige of its former greatness, when it rivaled the boiler itself in diameter, has disappeared.

The principal dimensions of these Rio Grande Western locomotives are as follows:

Richmond Compound Consolidation Locomotive for the Rio Grande Western.

General Dimensions—	
Gage	4 ft. 8½ in.
Fuel	Bituminous coal
Weight on drivers	167,450 lbs.
Weight in working order	184,400 lbs.
Wheel base—Driving	16 ft. 3 in.
Wheel base—Total engine and tender	52 ft. 11 in.
Total length of engine and tender	63 ft. 2¼ in.
Cylinders—	
Diameter	H. p. 23½ in., L. p. 36 in.
Piston stroke	30 in.
Piston packing rings	Cast iron
Piston rod diameter	4 in.; material, Tenn. Bloom iron
Piston rod packing	Jerome metallic
Steam ports	H. p. 1½ in. x 23 in., L. p. 2⅝ in. x 26 in.
Exhaust ports	H. p. 3 in. x 23 in., L. p. 3 in. x 26 in.
Bridge width	H. p. 1⅜ in., L. p. 1¼ in.
Slide valves—	
Style	Double ported
Greatest travel	H. p. 5½ in., L. p. 6 in.
Lap—Outside	H. p. 1 in., L. p. ⅞ in.
Lap—Inside	H. p. ⅜ in., L. p. ⅜ in. neg.
Lead in full gear	1-32 in.
Valve stem packing	Jerome metallic
Wheels—	
Driving, number	8
Driving, diameter	56 in.
Driving, centers, material	Cast steel
Driving, box material	Cast steel
Driving, axle journal	9 in. x 12 in.
Crank pin, main	O. H. steel 7 in. x 6½ in., 7¼ in. x 5⅞ in.
Crank pin, side rods,	O. H. steel, 5¾ in. x 4½ in., 5¾ in. x 4¾ in., 6¼ in. x 5⅝ in.
Engine truck, style	Center bearing, swing bolster
Engine truck, wheels	Number, 2; diameter, 30 in.
Engine truck wheels, centers	McKee-Fuller, C. I. steel tired
Engine truck axle	O. H. steel; journals, 6½ in. x 10 in.
Boiler—	
Type	Extended wagon top
Working pressure	200 lbs.
Outside diameter, first course	74 in.
Thickness of plate, in barrel	¾ in. and 13-16 in.
Thickness of plates, roof and sides	⅝ in.
Seams, circumferential	Double riveted
Seams, horizontal	Butt joint sextuple riveted
Fire-box, length	122 in.
Fire-box, width	41 1-16 in.
Fire-box, depth	Front, 77¼ in.; back, 71 in.
Fire-box, material	Steel
Fire-box, plates	Sides, 11-32 in.; back, 11-32 in.
Fire-box, plates	Crown, 11-32 in.; tube, ½ in.
Fire-box, water space	Front, 4½ in.; side, 4 in.; back, 4 in.
Fire-box, crown stays	Radial, 1⅛ in.
Fire-box, stay bolts	15-16 in. and 1 in.
Tubes, material	Charcoal iron; length, 14 ft. 2⅞ in.
Tubes, number	318; diam., 2¼ in.; thickness, No. 12
Heating surface—Tubes	2,667 sq. ft.
Heating surface—Fire-box	206 sq. ft.
Heating surface—Total	2,873 sq. ft.
Grate—Style	Cast iron, rocking, finger
Grate—Area	34.7 sq. ft.
Exhaust pipe—Style	Single
Exhaust pipe—Nozzle	5 in. and 5¼ in.
Smoke stack—Inside diam.	15 in.
Smoke stack—Top above rail	14 ft. 8½ in.
Feed water supplied by	2 No. 11 Ohio
Tender—	
Weight, empty	43,200
Frame	10-in. steel channels
Wheels—Number	8; diam. 33 in.
Journals	5 in. x 9 in.
Wheel base	17 ft. 11 in.
Tank capacity—Water	5,000 gals.
Tank capacity—Coal	10 tons

Master Mechanics' Convention.

The thirty-fourth annual convention of the Master Mechanics' Association was opened Wednesday morning, June 19, at Saratoga, N. Y., by the President, Mr. W. S. Morris, of the Chesapeake & Ohio. After prayer an address of welcome was made by the President of the Village Board of Saratoga, to which Mr. George West, of the New York, Ontario & Western, replied. Then followed the President's address, from which the following is extracted:

President's Address.

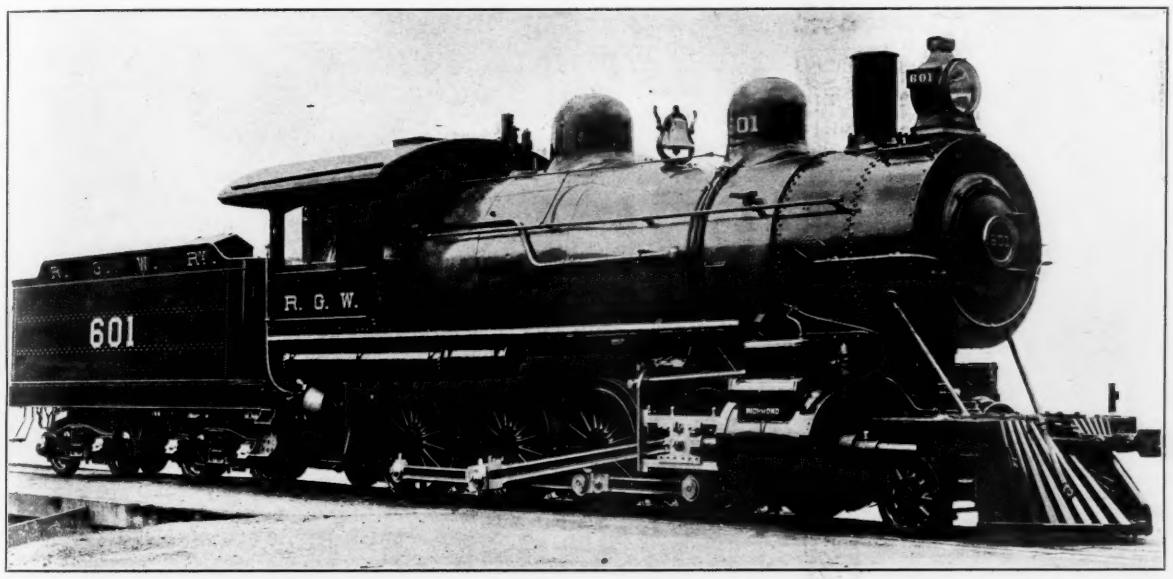
In two years ending with 1899, the last reported upon by the Interstate Commerce Commission, the freight traffic of the country had increased 30 per cent., while the increase in population is said to have been about 2 per cent. This increased business has been handled with an increase in the number of freight locomotives of but 1.6 per cent., and in freight cars of but 6 per cent. There has been an increase of 52 per cent. in freight traffic in the past six years, and yet only 7.5 per cent. increase in the number of freight cars, and 3⅝ per cent. in the number of freight locomotives; but, of course, there has been a gradual increase in the capacity of the equipment, due to the construction of larger cars and locomotives. In 1894 the average freight train load was 179.8 tons, and in 1899 it was 243.5 tons, or an increase of 35 per cent. In this time there has been an increase of 48.6 per cent. in the number of ton-miles per freight engine, and 43.8 per cent. in number per freight car.

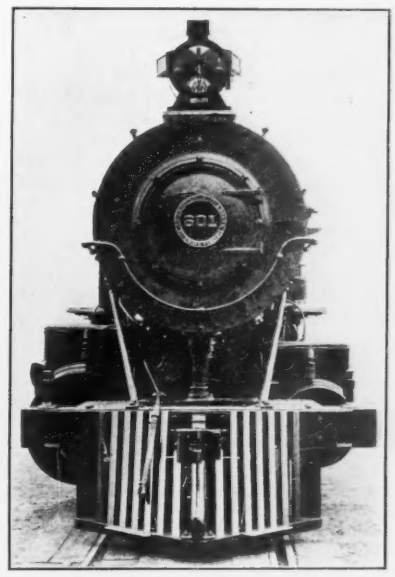
We may divide the railroad history of this country into four parts: Establishment; extension; improvement in the scope of the original conception and the introduction of scientific training into locomotive building, equipment and operation. The last two are now before us, and constitute our problem.

It is well that we should occasionally remind ourselves of the place we have to fill as an organization, and examine the results we attain as an incentive to more important achievements, not forgetting the fact that this is a national association. As local and special organizations increase in number and capacity, it seems advisable to inaugurate systematic co-operation, with a view to recording in our official annals the whole of motive power progress. May we not now rely with confidence upon other associations for that which is closer to them, and devote our energies to broader matters and those which affect us as a whole? . . .

The motive power problem during the past year has been met successfully with machines that would have raised a storm of criticism a few years ago. The simple eight-wheel passenger machines of practically recent construction had reached the limit of size under existing conditions, and were the permanent way the only ob-

of Saratoga, to which Mr. George West, of the New York, Ontario & Western, replied. Then followed the stacle, additional concentrated axle load should and must be avoided for reliable performance and freedom from heated bearings. A number of simple ten-wheel passenger engines have been constructed, which weigh 175,000 lbs., with about 133,000 lbs. on the drivers; the boilers having 2,800 sq. ft. of heating surface, carrying 225 lbs. of steam, and when it is remembered that only a few years ago, probably not over five, the heaviest ten-wheeler for passenger service did not exceed 140,000 lbs., with 1,800 sq. ft. of heating surface, and carrying 180 lbs. of steam, the increase in the capacity of this class of machine is more readily comprehended. It may be indicated at this time that the limit has been reasonably reached for the ten-wheelers, for almost the identical conditions that were met with in the increase in size of the eight-wheel passenger engine. Yet, the obstacles in both machines have only served to hasten other productions from the creative mind of the engineer, for the demand for additional capacity to meet service requirements. Accordingly we have now in successful operation, passenger machines with six drivers connected and a trailer, as well as the trailer in the type of eight-wheelers, both of which admit of having additional grate area and boiler capacity, avoiding the prominent objections entertained in the machines of the next earlier production. In freight service a graduation from the machine of five or six years ago, of 160,000 lbs., to some of over 250,000 lbs., further demonstrates the unusual hauling capacity that has been successfully attempted and accomplished.





Richmond Compound Consolidation Locomotive for the Rio Grande Western.

The compound locomotive has been with us for several years, and as lately as 1897 it was pronounced by a former President of the Association as "still in the balance." We cannot be proud of the fact that its status has not changed since then, and that its place has not been defined and established.

Under the head of boilers, to meet the conditions already alluded to in the increase of capacity of locomotives, is observed the wider fire-boxes for machines burning bituminous coal. It has been found that wide fire-boxes, designed for burning anthracite coal, will not successfully operate with bituminous coal, they having limited depth and a larger grate area than was required. But with convictions that justified the wide fire-box for soft coal burning engines, it has been introduced successfully. The requirements are, for large engines, a wide grate with from 45 to 60 sq. ft. and a deep fire-box, this explaining the necessity for the trailing wheels referred to before. The results obtained from this arrangement for both freight and passenger machines apparently warrant the prediction that they will be adopted for new construction very extensively in the future on account of their being more easily fired, and the lower rate of combustion allows inferior grade of coal to be burned.

Among the subjects for discussion at this convention is a most important one. "What is the most promising direction in which to effect a reduction in locomotive coal consumption?" This is not by any means the only important one; but it opens up the vital question for which we exist as an association. Thus far the locomotive has advanced prominently in weight and capacity, or in other words, brute force. We now have before us the problem of making each ton of weight stand for the maximum possible horse-power, and in this there is much to be done. It will never be possible to improve the locomotive to a point in which it will compare favorably with the best marine and stationary service, with regard to the number of pounds of coal per indicated horse-power per hour, but in the line of its present standing, as a machine which must run on the road and be relatively inexpensive to maintain, much may yet be done in increased economy in the use of steam.

Among progressive methods which should be entertained prominently at this convention is the necessity for improved facilities for quickly turning engines at terminals. Until recently it was thought that anything in

the form of a roundhouse would suffice, but now the passenger engines are expected to make 100,000 miles, and freight engines from 40,000 to 50,000 miles per year. Round-houses need more attention than was formerly given to shops, and this is brought about for the best of business reasons. There is scarcely any direction, except, perhaps, in economies in fuel, in which our work will bring more immediate and satisfactory returns than in prompt work at terminals. In busy times terminal conveniences are more readily realized and appreciated because idle machinery for road service is shown to be so prominently unproductive from the fact that the quicker and better the round-house works the smaller the number of engines required.

In closing I would like to remind you that the remarkable changes in the ownership and control of some of our largest roads must be taken to indicate most important alterations in the situation in which we are a part, and it behooves us to watch lest we fail in some degree to appreciate what it means to the departments which we represent, and with renewed efforts meet the new problems in a way that will inspire confidence and absolute progress.

The Secretary reported a total membership of 680 divided as follows: Active members, 637; associate members, 19, and honorary members, 24, or an increase of 15 members. During the year 15 members have died. Two vacancies now exist in the Stevens Institute scholarships, but it is expected that the places will be filled within a few days. The Treasurer reported a balance on hand of $3,712.90. The dues for the current year were made $5, the same as last year.

Election of Officers.

The convention elected the following officers to serve during the ensuing year, which action can best be recorded at this point: President, A. M. Waitt, New York Central & Hudson River; First Vice-President, J. N. Barr, Baltimore & Ohio; Second Vice-President, G. W. West, New York, Ontario & Western; Third Vice-President, F. A. Delano, Chicago, Burlington & Quincy, and Treasurer, Angus Sinclair. Mr. J. W. Taylor was reappointed Secretary of the Association.

Honorary Members.

The following were elected honorary members: Henry A. Sprague, a member since 1868; Reuben Wells, 1868; D. O. Shaver, 1868; William Swanston, 1868; J. H. Setchel, 1869; J. M. Boon, 1869; John Hewitt, 1871; W. H. Lewis, 1873; W. A. Foster, 1875; Allen Cook, 1879; J. M. Scheer, 1891; L. B. Paxson, 1895.

The next order of business was the presentation and discussion of reports. The constitution was changed so that candidates for associate membership would be voted on by letter ballot, so that nominations for honorary membership would be made by the Executive Committee. The By-laws were changed so as to limit the time to five minutes that a member could have the floor for discussion.

CAST IRON AND STEEL-TIRED WHEELS.

(*See Railroad Gazette, June 21, page 425.*)

Mr. R. C. P. Sanderson—Assume for the purpose of illustration that for 100,000 lbs. capacity cars, you can get a steel tired wheel for from $40 to $50 that will answer the purpose, and a cast iron wheel of first class quality for $8.50; that a steel tired wheel with 3-in. tires will run 300,000 miles before renewal is necessary, and a cast iron wheel will run 50,000 miles under a 100,000 lbs. capacity car. Assuming that the average coal car of 100,000 lbs. capacity would run, say, 45 miles a day and figuring interest at 5 per cent., I have carried forward the two sides of the account. I have taken the cost of ten steel-tired wheels up to the time when the first turning becomes necessary, adding on the accrued interest from year to year, as the account is not closed, then adding the cost of turning and replacing and again carrying forward the interest, again adding the charge for the second turning and replacing, etc., up to the time when the wheel is to be removed either for scrapping or for repairs. The net cost for service for 3,000,000 miles with steel wheels would be $1,071.43, or per thousand miles it would be 35.714 cents. For the corresponding mileage to be gotten out of the cast iron wheels, on the basis of the figures mentioned, the cost would be $580, or 19.689 cents per thousand miles.

Mr. A. E. Mitchell, Erie R. R.—I noticed Mr. Sanderson took an $8.50 chilled wheel, probably a 650-lb. wheel. In talking with a manufacturer of wheels the other day, who is placing a large number of chilled wheels under 100,000 lbs. capacity cars, he said in his opinion he did not think an $8.50 wheel would be safe for that equipment. He has put in a wheel worth nearly $11.00, and recommends a wheel worth $12.00 as being the proper wheel to use under 100,000 lbs. capacity cars to-day on the large roads of the country.

Mr. Sanderson.—I have not taken any one's figures. I have simply taken a set of assumed conditions. Any one who wants to figure the thing out on that line can use his own figures and see where he will land.

Mr. Pulaski Leeds, Louisville & Nashville.—Steel-tired wheels which will run 300,000 miles under a freight car must run on a more perfect track than the average railroad of to-day, from the fact that we must not only consider tread wear, but flange wear. But leaving that all to one side, in my opinion, we will be doing the railroads of the country a great deal more service if we can get 1-16 in. thicker flange, than if we save a dollar or two in the cost of the wheel. Our chilled wheels are confined to a limit in the thickness of the flange, and if we can secure a proper chilling of the throat of the wheel, with sufficient material to back it up properly for a 100,000 lb. capacity car, and especially a car that has a hopper bottom where the center of gravity is carried away above the rail line, and in which the flanges are under more severe service than on our other equipment, we shall do the railroads of the country a very great service. I believe the greatest part of our trouble is the center line of gravity being so high above our rail line, with the excessive weight, and our being confined to a thickness of flange which obtained when the equipment was lighter than it is now. To my mind, the mere matter of dollars and cents cuts but a small figure in this wheel question, because you cannot figure the incidental expenses of wrecks which occur from broken wheels.

TON-MILE STATISTICS.

Mr. C. H. Quereau, Denver & Rio Grande—Possibly the matter of ton-mile statistics may appear to some of our members as receiving too much attention. To me it seems a very important matter. I know there are those, especially among our superior officers, who consider the comparison of statistics of different railroads as a vital matter. I cannot hold the same view, for the reason that any one condition that can be named is not the same on any two systems of railroads, and cannot well be the same. If that is so, a comparison of statistics is only misleading. Take it on the little road with which I am connected. On the first division there are three districts, one division of one small road. No one of these districts of this one division can be compared with any other district of the same division. The size of the locomotives is different. The quality of the coal is different, there is an especial difference in the quality of the water. The grades are decidedly different, so that it seems to me that on this one division no two districts are fairly comparable. If that is true of the districts on one division of one system certainly it is more true when you undertake to compare any two systems. My view of the matter is that the best results will be secured by comparing the record of one division with its own record during previous periods of time. There the conditions are the same, or at least are well known. If they are not the same, it is probable that the conditions have been changed for the better, which is a legitimate result to be shown by statistics, because the object of statistics, I believe, is to better conditions and lessen cost, and every improvement which is required by new methods or the expenditure of money should legitimately be included in the statistics as a betterment.

In connection with the matter of ton-mile statistics there is another matter which seems to me to be very important. I know that a great many members of the Association differ with me in this respect. I refer to the inclusion or exclusion of the ton-mileage of the locomotive, in the dead mileage which is credited to the motive power department against which is charged the money for which they are responsible. I believe the idea of too many is that the motive power department should be judged upon the same basis as the operating department is. That is not a fair proposition. If the locomotive hauls company material, the work and money expended by the motive power department should be credited to the dead mileage, as hauling company material produces no revenue. I believe that the prime object of the General Manager is to study statistics from the revenue basis. The Superintendent of Motive Power cannot be judged on that basis. If that is so, the same set of statistics cannot be fairly used to judge a General Manager and the Superintendent of Motive Power. The latter has no control in any way of the number of cars which shall be put on his locomotive. He has no word to say as to how much the net load shall be, nothing to say as to whether the locomotive shall run light or haul its full capacity. That is laid to the door of the General Superintendent, who is an operating official. The General Superintendent could not be properly judged from a revenue basis. He should be judged by the percentage of tonnage rating which he secures by the use of the locomotives and machinery at his hands. He cannot be judged by the same standard as the General Manager. It seems equally true that the Superintendent of Machinery cannot be judged justly from the standpoint of the General Superintendent, because the former has no control over matters for which the General Superintendent is responsible.

There is another point. Most of the members of this association are connected with roads which have comparatively light cars and have a comparatively small portion of helper-engine mileage. They have a small portion of double-header mileage. There are a number of systems in the United States, a few in the East and quite a number in the West, where the ton-mileage of the locomotives is a large per cent. of the total ton-mileage. On the road with which I am connected, the percentage of locomotive ton-mileage to the total ton-mileage will average 33 per cent. I can see no reason in fairness or common sense why the Superintendent of Machinery should not be credited with the ton-mileage which costs him one-third of his expenses. I believe you will agree with me in light mileage and double-header mileage the item of wages will be more than the proportion of the locomotive mileage to the total ton-mileage. The same is true as to fuel. On some roads it is economy to use three locomotives to every freight train. I can name several roads where that is true. In such cases, on certain districts, 65 per cent. of the total locomotive mileage is light engine mileage. Of course, the percentage of ton-mileage due to that service would not be as great as the engine-mileage, but it would be a very great percentage. I am willing to place the expenditure of money for repairs, fuel supplies and wages for a number of roads for the hauling of the locomotive itself at 33⅓ per cent. I believe as a matter of fairness it is the proper thing to allow that credit in ton-mileage, by which I mean the ton-mileage of the locomotive should be included in the ton-mileage credited to the motive power department against which to charge the money or which they are responsible. I believe the proper basis on which to charge motive power department is the same basis we would use in charging the performance of a stationary engine or electric plant, or anything else, and that is the cost per unit of work. So far as the motive power department is concerned it makes no difference whether it is revenue producing or not; whether it is power absorbed by the locomotive in going over the road light when the conditions require it.

The resolution I offer is: "Resolved, That it is the sense of this association that a strict comparison of motive power statistics, one with another, will not secure the best results, but such comparisons should be made with the same provision for succeeding periods of time." Carried.

Mr. F. A. Delano, Chicago, Burlington & Quincy—There is probably no member of this association who has given this subject the thought and time that Mr. Quereau has, and yet I cannot help feeling that if he had put as much thought and time to the matter of discovering how ton-mile statistics might be made comparable as he has to show how they cannot be made comparable, he would have gone a long ways toward solving the problem. I'm a little sorry that this motion has been passed, putting ourselves on record as being opposed to the comparison of statistics. I think it is idle to take that position, and I think we are inviting adverse criticism upon our organization by so doing.

Mr. C. H. Quereau—Each road will compare the statistics as it sees fit. I realize that statistics will be compared, and I have made an argument to put the ton-mileage of the locomotive where it belongs. The matter of unifying the method of compiling statistics is in the hands of the American Railway Association, as I understand it, and I also understand a committee has been appointed by the International Association of Accounting Officials, and the motion, as I intended it to be put, did not say that comparisons should not be made, but that the best results would not be obtained by making strict comparisons. That was the intention, and I would like that understood, knowing that comparisons will be made notwithstanding any amount of light that we may throw on this question. I would like to propose a further resolution to this effect: That it is the sense of this association that the ton-mileage of the locomotive is a just credit to the motive power department for statistical purposes.

After some further discussion this resolution was carried, and the committee continued for another year.

TOPICAL DISCUSSIONS.

President Morris—The noon hour having arrived we will take up the topical questions.

The Proper Method of Lubricating Locomotive Driving and Truck Axles.

Mr. G. R. Henderson, Atchison, Topeka & Santa Fe—It has often occurred to me that if we were to undertake to design a journal-bearing box so that it could receive the least amount of attention, could be made in the poorest way and to afford the very poorest amount of lubrication, the ordinary locomotive driving and truck box would be the outcome of this effort. This may sound like strong language, but I do not think it is any stronger than the language used when the engine of an important passenger train has to give up its work on account of a hot box.

The present method of putting a little oil on top of the box now and then, as convenience may dictate, allowing it to trickle through waste more or less saturated with sand or other filth, permitting it to get through the oil holes, if they are not clogged up with dirt, which oil holes are generally concealed by the frame, saddle or spring rigging, so that they cannot often be seen in broad daylight with waste removed, and then expect that a pound or so of waste in the bottom saturated with oil and stuffed up at great inconvenience on account of the proximity of the eccentrics or other portions of the machinery, and try and touch the journal where the jarring of the engine will tend to consolidate this waste and allow it to drop away from the journal, is certainly about as unmechanical and barbarous a method of equipping journals as may reasonably be gotten up.

You will naturally say, "If you can criticise so well, why not design one that will overcome these objections?" and that is only what I would be too glad to do if I knew how. Various suggestions have occurred to me which are perhaps more or less unsuited to the actual requirements of the case. One was to keep the bearings continually flooded with some cheap lubricant, something like the fluid we use in our shops for drilling compounds, which could be used in large quantities and allowed to run off on the track without attempting to collect the same.

Another method, which has been tried on a small scale and is now being experimented with, is of the type designed by the McCanna Lubricator Company. This consists of a force pump operated by a chain from one of the driving axles forcing oil absolutely through the pipes to the driving bearings and the truck bearings. Of course in this case regular oil is used and is dealt out in small quantities in accordance with the needs of the engine. It seems that we might go still further into this and instead of using a deep cellar filled with waste that we might have a shallow cellar of some soft metal that could be allowed to bear up tight against the box and the axle and catch the oil that drips through from the overhead space. This would act as a shallow pan and the motion of the engine would probably allow the oil to splash up against the journal from underneath. Just how satisfactory this proposition would be I am unable to state, as

I have not tried it, but the suggestion has come to me from other sources as well as my own thought, and it is possible that there may be some field for experimenting in this direction. Even with the very best of care that it is possible to give a locomotive, the bearings are liable to give trouble.

Mr. T. H. Symington—The principal trouble with our driving boxes is that we do not get the oil where we want it to go. The majority of driving boxes are constructed with a pocket on either side towards the wedge, and oil put in on top of the box will largely go to oil the shoe and wedge and not the journals. Another trouble is that the waste put on the top of the box gets full of dirt and grit and soon clogs up the oil holes. The matter can be helped by making separate pockets, as is frequently done, and covering over the waste on the top of the box with a plate of metal, with a hole over each pocket so that the engineer can put his oil can in the four points, one for the shoe, one for the wedge, one for the bearing and one for the under-play. I have done that and had satisfactory results.

Mr. J. Wheelock.—I have recently, in some electrical work, drilled some holes across the cap of an ordinary engine box, and circulated the feed water on its way to the boiler on top of the bearing, and have eliminated all heating of the bearing. If we could, by a system of piping properly arranged, conduct our water from the locomotive tender around our bearings, we would eliminate all hot boxes. Do not pour water on it and waste it. It should be good piping and arranged to avoid all unnecessary leaks.

Side Rods on Engines in Transit.

W. Garstang.—The temptation is very great to put the burden of the argument on the opponent's side and ask the question, "Why Shouldn't Parallel Rods Be In Position While in Transit?" Being an advocate of this practice, and knowing there are no serious mechanical difficulties to be overcome, I have had new engines shipped in as nearly complete condition as possible. The result has been entirely satisfactory and resulted in considerable saving to the railroad company. Like many other roads, we receive our new power at a point where there is only a roundhouse and but few men employed. This force cannot be taken from their regular duties, which necessitates sending men from some other shop to put the engines together. It is always necessary to send a higher class of mechanics, and the result is the first day or two these men are doing laborers' work, unloading heavy parts that are ordinarily packed in the tender coal space.

On the other hand, engines that are delivered with their side or parallel rods in position can be much sooner gotten into service, and at much less expense. Another feature of no little importance is the certainty that the rods have been properly fitted at the works, and there is less liability to give trouble when the engine goes into service.

I cannot say that from a mechanical standpoint there are any benefits to be had, other than those mentioned, which include the saving of time, money, and trouble, but our engineering and maintenance departments are taking a serious view of the matter, and in many cases advocate a strict rule requiring engines to be coupled up before they are accepted on the road. This seems a perfectly proper step to take. The day has passed when it is considered necessary to ship new engines in slow freight trains, but on the contrary, they are hauled in the fast through trains often at a speed of forty miles an hour, and the effect on the track of a heavy engine at this speed with a single pair of wheels as much as 1,000 lbs. out of balance is not to be desired. Imagine what the result would be of an engine going into regular service with the counterbalance in this condition.

Mr. David Brown, Delaware, Lackawanna & Western—I move that it is the sense of this association that the rods should be on the engines in traveling from the works to the railroads for which they are built.

Mr. P. Leeds—I hope the motion will prevail. We have been agitating this question, and we have had an agreement among the roads centering at Cincinnati that no engines will be handled without side-rods. This action has also been taken by our freight association. I would like to see this association indorse what has been done through the traffic associations as well as through the action of the individual railroads.

Mr. W. H. V. Rosing, Illinois Central—We are in the habit of receiving engines not only with the side rods coupled on, but also with the eccentric straps and the motion work, and they are delivered in good condition and perfectly satisfactory. The engines were always sent in the care of a messenger.

Mr. W. Garstang—A little over a year ago I wrote each of the locomotive builders asking if they had any objection to coupling up and leaving the rods in position after they tried the engine. I am pleased to say that a very large majority of them said they had no objection. One or two said that by leaving the rods in position it would increase the duties of the messenger to such a point he would not be able to take care of the engines. I do not think that is a point well taken, judging from the experience we had with parallel rods on engines turned out of our own shop.

THE COST OF RUNNING HIGH-SPEED PASSENGER TRAINS.
(*See Railroad Gazette, June 21, page 425.*)

Mr. G. W. Rhodes—While the committee says in a part of its report that it has not been able to arrive at anything very conclusive, yet one of the roads that has contributed to the report does state something very decidedly conclusive and pretty emphatic. It says that "in general, therefore, we may say that these tests indicate the cost for power as represented by the consumption of coal and water, of running trains, increases directly as the speed; that is, if we double the speed, the coal, water and drawbar pull are likewise doubled." That conclusion is reached not after guess work, but after some very carefully conducted laboratory tests, and I hope we will hear before the discussion closes a good deal more detail as to how that test was made and conducted.

Mr. J. F. Deems, Chicago, Burlington & Quincy—Something is said in the report relative to the keying up of all branches of the service due to high speed. I have not been sure that there is not a compensating element in that keying up that we do not properly estimate. I have in mind a case where on two rather high-speed trains an engine doubles a 200-mile division in about a little over 12 hours, while on two low-speed trains the engine doubles the same division in about 23 hours, showing the possibility of increased mileage and consequent reduction in the number of engines to do a given amount of work. It has occurred to me that possibly there is more of gain in the keying up of the entire service than we thought. In other words, that by keying up a service we get more out of the power. While it costs more to run high-speed trains, and while it costs more in keying up each train, it has occurred to me that by the increased service we get out of the power, possibly there is more gain on that side than we have figured on. It is something indefinite.

Mr. F. A. Delano—The high-speed trains, of which there were three tests, were run under the best weather conditions, and they were run at night and in the summer time. The train was operated strictly on time. The engine on the train was suited to high-speed service, and was a Columbia type engine with 7-ft. driving wheels, and the train tested against it was a train specially made up and run on a special schedule. The engine used was supposed to be suited to that speed with driving wheels 69 in. in diameter. You will find an interesting table in the report showing the grate area of the two engines and the consumption of coal per square foot of grate. Two of the three trips of the high-speed train there was burned just under 100 lbs. of coal, and on the third the coal consumption was slightly less than the other two. Whereas, with the low-speed train and an engine with a small grate, the coal consumption was slightly over 50 lbs. I also want to call your attention to the speed that was necessary to make in order to keep up a schedule of between 50 and 51 miles an hour for the entire distance of 205 miles. It is well known, but it is often overlooked, that in order to keep a train on time, making necessary stops, you have to exceed your schedule a good part of the time. You will find that the average of the three trips, 22 miles had to be made at the speed of 50 to 55 miles per hour; 30 miles at a speed of 55 to 60 miles an hour; 71 miles at a speed of 60 to 65 miles per hour; 40 miles at a speed of 65 to 75 miles an hour and 13 miles had to be made at a speed of 70 to 75 miles and 2 miles at a speed of 75 to 80. I thought it would be interesting to analyze the speeds in that way. A very small distance was made at the low speeds.

Those who have written on the subject, commenting on the cost of speed, have assumed from what I have written that I am opposed to the idea of running trains at high speed. That is not my attitude at all. I think high-speed trains have come to stay in passenger service, mail service and fast freight service. But I think it is important that mechanical men should not forget that it does cost money, and they should try to analyze what that cost is as accurately as possible. There are men in the railroad service in the commercial end who really think that this feature of cost of running trains at high speed is all bosh. They know they can get more passengers if they run their trains fast, and more freight. If we sustain them in that attitude they will come back and say: "Let's run them all that way." Have we not a legitimate defense for ourselves? I am very certain in my mind that our expenses will run up considerably, and we have not begun to get to the bottom of the questions that are involved with that of the despatching capacity of a road running some trains at high speed. It is not an uncommon thing for a freight train to be on the side track an hour because it cannot get to the next station before a fast train is due. Even on a double-track road that is not at all uncommon.

Mr. T. H. Symington—I think the report of tests made on the Burlington is the most accurate of them all, but to say that it takes twice as much coal to run a train of the same weight the same distance in half the time, I think is not always correct. The report shows that the drawbar pull is about half in the slow train as it was in the fast train. Now, the product of the drawbar pull by the speed would to some extent indicate the amount of work that had been done between terminals, and I think that all that test proves is that the engine on the slow-speed train was working very much more economically than on the high-speed train. I have seen fast trains run where the cost of coal was very little in excess of slow-speed trains. I think it is entirely a matter of having your engine suited to the service, and I think that is practically covered in the increased cost in the first instance of a high-speed engine. If we assume a high-speed engine costs 50 per cent. more than a slow-speed engine, we certainly can assume that the money has been put into the boiler, so that it will work as economically at high speed as the other engine will at slow speed. So I do not believe you can say that the cost of coal is anything like 50 per cent. more on a train running at double the speed of another train.

Now, in the cost of maintenance and inspection I do not believe that that cost is proportional with the increase in speed. I think that if we all reduced the speed of our trains to-day 50 per cent., we would not want to reduce inspection in our roundhouses one dollar. We are getting the benefit of that increased inspection in the case of the slow-speed trains. Reduced detention, breakdowns and accidents are certainly of as much benefit in the case of engines running at slow speeds as with engines running at high speeds, and I do not believe we can take the ground that we would reduce our inspection expenses if we reduced the speed of the trains. So I believe that the increased cost due to the high-speed trains is on account of the increased first cost of the engine and a small increased cost in coal and transportation expenses.

HANDLING, CLEANING AND SETTING BOILER TUBES.
(*See Railroad Gazette, June 21, page 425.*)

Mr. David Brown—I notice the committee suggests we use the same thickness in the safety end as in the body of the flue. We find good results by using one gage thicker. For a No. 12 flue we use a No. 11 safe end. The reason is that it expands under rolling and lasts longer. Then the committee recommends putting all the safety ends on one end of the flues. There are times when a safety end does better to put it on the other end.

Mr. C. H. Quereau—The question has come up as to whether a proper weld can be made between a steel tube and a steel safe end. It is not as to the durability of steel. A number of years ago experiments were made on the Chicago, Burlington & Quincy at the time I was connected with that road. The process is the same as in the iron tubes, but as a flux we use borax and silicate of soda. The results were satisfactory, and as their experience extended over a number of years, I hope Mr. Forsyth will tell us about it. I believe it is the solution of that trouble.

Mr. A. Forsyth, Chicago, Burlington & Quincy—There is not much to say on the subject. At one time we had difficulty in welding steel tubes. In order to get the flux we tried water-glass and borax, and it answered well, but we still had difficulty in welding tubes to the steel safe ends. Out West we remove the flues after ten months or a year to clean them, and that is the only reason we think an iron tube is better than a steel one, that they are much more easily welded.

Mr. A. E. Mitchell, Erie R. R.—We have two switching engines equipped with steel tubes. Of course, they are not equipped with safe ends, but before applying them we made a test of iron safe ends with steel tubes, to see if we could not use an iron safe end on a steel tube. We found with the Shelby tube there was no difficulty in using an iron safe end and getting perfect results. We have not conducted any tests in the matter of welding steel safe ends on steel tubes, but we know that the iron safe ends are all right.

Mr. W. Garstang, Cleveland, Cincinnati, Chicago & St. Louis—About a year and a half ago we put in a set of steel tubes on one of our large freight engines. These tubes were removed and upset about two months ago. At the time we got the set of steel tubes we also got enough safe ends of the same material to piece them out when it was necessary. The man running the flue-welding machine fire, who was welding these tubes, did not know whether they were iron or steel, and we have found that they worked satisfactorily. I do not think there is any question about welding an iron safe end to a steel tube or welding a safe end made of material similar to the steel tube.

Mr. John Platt—I have had to do with the Thornycroft water tube boilers in marine service, and that being a bent-tube boiler we had to take up the question of a steel tube owing to the bending of the tube. At that time the drawn steel tube was coming in. That is a tube made of soft steel, and in our experience with these tubes, extending over the last nine years, we have found that the steel tube often pits. We have put a set of tubes in these boilers, and in four or five months they will be pitted. Perhaps we have had more to do with the question of steel and iron tubes than any one else in the business, owing to the large number of water tube boilers which have been used. Six and a half years ago, when the boilers were first used by the Navy, iron tubes were specified by the Engineering Department. We could not bend a welded tube very easily, and as we had used the drawn steel tubes on the other side for five or six years the specifications were changed. When these tubes are made of thoroughly good material, properly annealed, they give very little trouble. They are, however, subject to this same trouble from pitting in some cases. In England, we found some boilers which had not been out of the shop a year where the whole set of tubes had pitted right through. Other steel tubes, made under the same specifications and submitted to the same tests, which had been used for seven or eight years, showed no pitting at all. We have never been able to find out what causes the pitting, and it is only on rare occasions that it has taken place. The service is a severe one, the boilers being forced very hard, and sometimes there will be pitting and sometimes not. It is the practice in some works to pickle the tubes, putting them in acid. I am very sure that is a bad thing with steel. It was the practice in England, and I know in some cases serious trouble arose owing to the pickling of the tubes. They cannot get rid of the free acid, and if there is the slightest point of imperfection in the tube it will cause pitting at that point, and the pitting will surely take place if the tubes are made of Bessemer steel. With the open hearth steel there has not been the same trouble. The principal reason why you have trouble with the welding is that in the drawn steel tubes they do not pay attention to the annealing, and some tubes will be hard and some soft.

Mr. F. F. Gaines—I have not heard any one say anything in connection with the steel tube as to the matter of tests. Going back a little in the history of fire-box steel, we know when fire-box steel was first used, we employed a soft quality of steel, and had trouble with pitting, and as the carbon was increased in the steel and a harder steel was made, that it did away with the pitting. I am told that the proper material for steel tubes should be similar to the fire-box steel; the carbon should be medium high and the steel should stand nearly the same physical tests.

Mr. F. A. Delano—As to this pitting of tubes, I think it is a mistake to suppose there is no cinder rolled into a steel tube. All who have inspected boiler plate know that you get cinder pits in boiler plate which come from the small blow-holes in the ingot. That same thing can occur in the ingots from which the tubes are made.

Mr. T. H. Symington—I think we spend a great deal of energy sometimes in the wrong direction on these boiler tubes. On roads with good water you can set the tubes in almost any way, and they do not give trouble. I know of cases where tubes run three or four years without leaking. On roads with bad water, no matter how you set them, no matter how much money and thought you put on the matter of the setting of the tubes, you have trouble. By purifying our water we could largely eliminate the trouble we are having in setting tubes. Many methods of purifying feed water have been recently before us, and I think that is the direction in which we can secure the best results in the setting of tubes.

Mr. P. H. Peck, Chicago & Western Indiana—Flues after being carefully set must be taken care of or they will leak. When an engine comes in, and it stands a long while, by placing a board over the stack you will greatly reduce the heat. This in itself will obviate one cause of trouble with the flues. In discussing this subject with a railroad official he told me he overcame the difficulty by using about half a dozen stay-tubes in a 66-in. boiler, these being put in exactly the same way as in the ordinary marine boiler and that overcame the trouble.

Mr. Mord Roberts, Louisville & Nashville—On our road we have some very bad water, but are not troubled with leaky flues except where the flues are extremely long. We have recently introduced the practice of reaming the flue holes the same taper as the drift pins in both sheets. This applies to the old sheets when removing the flues for replacement. I suppose the experience of all is that in constantly replacing the flues after the sheet becomes old, particularly when rolled by hand, the flues become oblong. We have a tapered reamer with a collar which we operate with a motor to clean the hole out and make it perfectly round. In applying our ferrules in the back end we roll the ferrule in the hole, allowing it to expand there nearly flush with the sheet, and since we have adopted this practice we have practically done away with the trouble of leaky flues in the sheets.

REDUCTION IN LOCOMOTIVE FUEL CONSUMPTION.

(See Railroad Gazette, June 21 page 426.)

Mr. G. W. Rhodes—In a conversation between our President and Mr. Miller of the Galena Oil Company recently, the latter said if he were a young man he would go to the railroads and offer to take their coal account and make the same contracts that he had in regard to the oil. That is to say, he would take any road, if they would give him the accounts and give him certain privileges over the road as they have done in regard to taking charge of the oil, and would guarantee to reduce the coal account 10 per cent. I believe he would do that easily. The reason is that he would not give up. I do not think we should wait until some supply company hires a man to look after these things for us. We might as well hire such a man ourselves. I believe it would pay a railroad to hire a specialist to do nothing but look after the coal account, and it is my opinion that the saving which he would effect would pay his wages and traveling expenses over and over again. I know from the experience on our road, where we hired a specialist to look after the freight car oil, a man who had nothing to do but to look after this one matter, and the savings we made in freight car oil paid his expenses many times.

R. P. C. Sanderson—Reference is made to the compound engine. I have some hesitancy in opening that question, but I want to be distinctly understood as fully indorsing the compound principle when properly applied, but there are times and conditions of service when the compound is, I believe, not as economical as a simple engine. There are conditions of service where the compound and triple expansion engines have given their highest satisfaction, as in marine work, pumping duty and in stationary service where the loads and speeds are fairly constant. In these particular lines the principle of divided expansion has reached its highest development and efficiency. In cases on a railroad where the grade is practically uniform, nearly level or extrémely heavy, and the engine can work for a great proportion of its time, or at least during a large proportion of its fuel consumption, at a definite rating of power for which it was originally designed, there is no question in my mind but the compound engine is the proper thing. But where you have a varying roadbed, and where you want to change your engines from one division to another continually, so as to make the best use of your power, and one division may be suitable for the compound and one division may not, I am rather in doubt whether it is fair to say that the compound engine will be as successful as a well-designed simple engine under these conditions. There are certain conditions to which the compound engine is applicable, and I believe the early failures of the compound were due to its misapplication.

Mr. M. K. Barnum, Union Pacific—I take issue with Mr. Sanderson's statement in regard to the compound engine not being of uniform economy. The Union Pacific has in service, or about to go in service, 124 24-in. cylinder compounds and two cross compounds, and great economy is expected in the matter of fuel. The compound engine strikes me as being the most fruitful source of fuel economy we have yet tried. The past year or so we have been making a special effort to economize in fuel, and among other things have tried the compound engine, traveling firemen and some special fire doors. We have not yet tried wide fire-boxes, but are about to do so, and expect good results from them. It seems to me that the compound engine is uniformly economical, although I will agree with Mr. Sanderson that there are some conditions in which it is more economical than in other conditions. These conditions are where the engine is working continuously as compared with conditions where the engines would drift part of the time. That is the natural result, as it would present the opportunity for the compound feature to show its efficiency. The committee has very properly placed this feature at the head of the list of full economies, and while our experience has been small with the wide fire-box, I judge that would be a very good second as a source of fuel economy, and as the third thing I would suggest the traveling firemen, coupled with light intermittent firing, as that would be the principal object of his instructions.

We have used traveling firemen very successfully on the Union Pacific, although we are not just now using them on account of business being light. But the results obtained by our traveling firemen, when they were well qualified for their work, have been gratifying. We have had cases where traveling firemen would show from one-quarter to one-third reduction in the fuel consumption on a trip of 153 miles in freight service.

Our compound engines in the passenger service show from one-quarter to one-fifth reduction in fuel. On one of our heaviest passenger trains, making 156 miles, going West, we were formerly burning with ten-wheel engines, 24-in. cylinders, from 11 to 14 tons of coal on ten-car trains, and the compound engines now on the same train are making the trip with from 7 to 9 tons of coal, and under favorable circumstances with even under 7 tons. Another case is on a 137-mile run, with a ten-car train, we make the run with from 5 to 7 tons of coal, where we formerly used from 8 to 10 tons.

Mr. A. L. Humphrey, Colorado Midland—The committee has very properly recommended a daily record, but it has been remarked that that would be impracticable. I inaugurated a system about five months ago of making ten-day records. This can be done on divisions where the mechanical department handles the coal records by having the tickets pass through the different division headquarters, and at the end of every ten days make a statement showing the record of the ten days just closed. That record can be made on the eleventh day, comparing the record with the previous ten days, or previous month, for the same engine, same engineer and same fireman. When I started that system, and posted the notice in the roundhouse, it at first attracted no attention whatever, but it was not long before they were coming to the division officers and myself, suggesting ways of improving fuel records and improvements to the locomotives. We have found by these comparisons and by interesting the men we are accomplishing results. First we must stop the leakages. We must then see that the records are correct, and that no man's record is inaccurately stated. If the records are not reliably given it has a tendency to make the men lose interest in the matter.

Professor W. F. M. Goss, Purdue University—With reference to the discussion in the report as to clearances, I think that is evidently but a partial discussion of the subject. It is correct so far as the statements go, but it is not correct as to the impression which it leaves. It says that for a given percentage of clearance, a certain volume of steam must be admitted and as the clearance increases, the excess steam for clearance must be increased. It is implied by the table that this steam is all lost. If we think of it we shall see it is not lost. Steam admitted to fill the clearance space does work during expansion. If we cut off at the beginning of the stroke, all the steam admitted to the cylinder would be admitted to the clearance space, and yet the engine would run, as the steam admitted would do work through expansion. If we take into account the point that there can be an adjustment between the amount of compression and clearance, which will practically utilize the loss from increased clearances, we will cover the whole point. My opinion is that steam admitted to the clearance space is not lost.

Experience with stationary plants suggests a point with reference to this discussion. In making tests of pumping engines it is customary to measure the water fed as it goes to the boilers and as it comes from the condenser. The same steam is measured twice, first as feed and then as condensed steam. If there is no leakage, there should be no loss, but with the piping as tight as it is possible to get it, it is impossible to get the two streams to check, the closest being 2 per cent., and sometimes the difference is 5 per cent. This piping will be in the building, and there will be no apparent steam leaks. This suggests the fact that the probability is that the steam leaks from the ordinary locomotives by defective valves and attachments are very considerable, and the fuel losses resulting from small steam leaks are too great to be overlooked in any close analysis of the subject.

I have recently been concerned in a pumping engine test which lasted over 72 hours. The conditions under which the engine was run were constant within 1½ per cent. during the 72 hours, speed, pressure and working the same. The firemen worked in eight-hour watches, and the difference in the amount of coal consumed in the eight-hour watches was very material, amounting in the case of one fireman, comparing the worst fireman with the best fireman, to more than 25 per cent. If that happens in stationary engine practice, what must it be sometimes in locomotive practice, where the whole process of combustion is much more intense?

The matter of draught always determines the thickness of the fire, other things being equal. That is, if there is enough draught to produce the combustion required we have a satisfactory condition. If the draught is too light the combustion is imperfect, but if our draught is light we must not fire too thick; and it may interest you to know how thin the fire of the locomotive may be under favorable conditions. We look into a fire-box and see a great glow, and it is difficult to say how thick the fire is; a fire a few inches thick may appear to be several feet thick. I have made a study of the thickness of a fire on the grate of a locomotive, and find that even when the rate of combustion runs above 100 lbs. of coal per foot per hour, that the thickness of the fire will not be over 3 in. when the fire is in good condition; 3 in. above the grate.

TOPICAL DISCUSSION.

Wanted: A design of piston followers, bull ring and packing ring for cylinders of large diameter that avoids the necessity of removal of piston from cylinder to change rings, the removal of piston on account of wear, the use of snap rings and the use of riveted followers.

Mr. W. McIntosh, Central Railroad of New Jersey—We have all experienced more or less difficulty in this direction, especially since the advent of the modern large locomotives. The piston of the solid type, equipped with snap rings, must be unkeyed from the cross-head and removed whenever necessary to change rings and in our experience that necessity occurs quite often. If, on the other hand, it is provided with bull rings and a follower secured by plates held by bolts, there is a possibility of the bolts breaking and damaging the cylinder and cylinder heads, frequently breaking the followers and the spider or piston head also. I think all will agree that a device which will permit the easy removal of the bull rings when necessary to replace the packing would be received with pleasure, and it would seem possible that some device could be developed. With a bull ring that could be easily removed there would be no necessity for the removal of the piston head, as is the common practice with the solid head with snap rings, when it becomes worn. It would only be necessary to remove the bull ring and substitute another, when the cylinders become worn to such an extent that they had to be bored. It is possible that some such easily accessible follower is in use, but it has not come to my attention. My idea of what will constitute the most satisfactory arrangement is something similar to the breech-lock of a piece of modern ordnance. You could insert the bull ring in place and then drop in your fastening and give it a few turns and that will end the labor of exchanging.

Mr. W. Cross, Canadian Pacific—For many years we ran the piston head with follower and bull ring, and thought we were on the safe track. But after our experience we were compelled to abandon them and adopt the solid head.

Mr. David Brown, Delaware, Lackawanna & Western—I had some experience with a solid head on the other side, and when I came to this country I was very much pleased with the arrangement they had of the piston forming the spider, and the bull ring and the follower. We followed that practice for about 29 years, but we went back to the solid heads recently. The solid heads are all right in some cases, and have some benefits, but beyond that they have many defects. One of the benefits is that when taking out the cross-head and end of the rod can be examined at the key more frequently to see if there are any leaks forming.

The Best Material for Crank Pins.

Mr. A. L. Colby, Bethlehem Steel Co.—The company with which I am connected has made a specialty of high-grade forgings for a large class of purposes, and I am grateful for the opportunity of saying a few words to you on the matter of nickel steel for crank pins. At your convention at Old Point Comfort, two years ago, one of our engineers, Mr. Porter, addressed you on the subject of nickel steel, and since that time we have sold to some 44 different American railroads and several locomotive works nickel steel forgings for locomotives, including crank pins, piston rods, axles, cross-head pins, wrist pins and so forth. We have not heard of a single failure of our specially annealed nickel steel used for these purposes. We have supplied 2,419 nickel steel crank pins alone. The earliest of them were delivered in 1897. It is not necessary for me to address you on a subject so familiar to you as the "fatigue of metals," nor to call your attention to the fact that any material

under constant strain wears out, and that a material which has a high elastic limit, which is especially true of nickel steel, will last very much longer under rapid changes from torsion to compression.

In other words, nickel steel although somewhat more expensive than ordinary steel is, when properly made, machined to proper shape, and subjected to careful heat treatment, the best material possible for such purposes as crank pins, where it is subjected to severe strains in service. The initial cost of the material cuts no figure in comparison to the annoyance and delay of the replacement of material, capable at best of much shorter service.

A PRACTICAL TONNAGE RATING. A PAPER BY G. R. HENDERSON.

(*See Railroad Gazette, June 21, page 423.*)

Mr. C. H. Querau—I heartily approve of the paper. I am inclined to differ somewhat from Mr. Henderson's conclusion that practical ratings can be made out theoretically in the office. I have no doubt the methods he proposes and works out in such an admirable manner will save time in establishing reasonable ratings for any district, division or system. At the same time I am strongly inclined to believe that these theoretical ratings should be subsequently revised and arrived at in a more positive manner. I am familiar with a road where tonnage ratings were established on somewhat similar lines, not to the extent recommended by Mr. Henderson, however, but the results proved quite satisfactory. One class of engines were rated by actual tests under varying conditions, and the ratings of other classes of engines were calculated by the tractive formula given by Mr. Henderson and worked out satisfactorily.

I doubt if the influence on tonnage ratings of empty cars is fully appreciated by our higher officers. A number of tests have been made with dynamometer cars, which show on trains at ordinarily slow speeds that an empty car requires about 7 per cent. more power than the same tonnage in a loaded train. It has been demonstrated clearly that the greater capacity the car has, assuming it is fully loaded, the easier the draught per ton to haul it. A 100,000 lbs. capacity car will require less drawbar pull per ton than a 60,000 or 80,000 lbs. capacity car. The greater the difference between capacity and car loading, the greater the difference between the drawbar pull. It occurs to me that the tonnage rating should be made with this in view. In fact several roads have adopted a system of this kind in which the effect of an empty car on the power required to haul it is taken into consideration. I believe we ought to emphasize very strongly this fact.

Mr. F. F. Gaines—About two years ago a committee of which I was a member made some tests, and we found that the average empty train against the average loaded train, required from 30 to 33⅓ per cent. more power.

Mr. R. P. C. Sanderson—I think the question of hauling empty cars at full tonnage rating is not very important. Usually the empty cars are moving in the opposite direction from which the business comes. Therefore, there is less and less full rating going in that direction, and it is seldom there will be necessity for loading the engines up to the full capacity, except, perhaps, in the movement of special cars for particular service, and then they go on fast trains at an arbitrary rate.

MAXIMUM MONTHLY MILEAGE.

Mr. G. W. Rhodes—The committee says: "It is the roundhouse that keeps engines in service, and we believe it is far better to thoroughly equip it with the best men and tools before giving any serious consideration to the balance of the locomotive plant." I am going to be sarcastic on that statement and say "Not always." I know of numerous cases where it was very essential that the engines should be out of service and in the roundhouse for repairs, but on account of wanting the proper facilities on the road they were kept out of the roundhouse. A road which does not keep up with its growth, and does not have telegraph stations at sufficient intervals, sufficient side track capacity, and if fast trains are run over the road along with slow trains, you will find your trains are apt to be delayed, sometimes nine or ten hours at stations, and valuable time will be lost that ought to be spent on those engines in the roundhouse. Partly on that account I rather deprecate the fact that we confine ourselves so much to the mechanical features of our work. We seem to be a little afraid of criticising the other departments. I notice in this report that the committee touches very gingerly on the transportation department.

I am one of the committee of the Rocky Mountain Railway Club on the subject of train failures. It would astonish many of us who are here to find out how many cases there are of train delays outside of the mechanical departments. I would urge our mechanical men not to be so afraid of criticising the other departments.

Mr. G. R. Joughins—About three years ago we thought that with 210 engines we had a fair number of engines to run our traffic with. At that time we increased our mileage about 13 per cent., and also increased the engine stock about 10 per cent., and since that time we have gradually increased the amount of traffic handled until the engine mileage got to be 90 per cent. greater than what it was at the beginning of the period; we almost doubled the engine mileage. Instead of doing our work with 200 engines, as before, we did with 230 engines the work of about 380 or 400 engines. We did that by increasing the number of crews on the passenger engines and pooling the freight engines and keeping them running 22 hours out of the 24 if possible.

Mr. J. F. Deems, Chicago, Burlington & Quincy—From my experience the only way you can successfully operate engines with double crews is where the business is uniform month in and out. Where the business fluctuates through a great range, it seems impossible to double-crew the engines and keep the men satisfied. Business falls off perhaps 50 per cent., and you have to reorganize the whole thing. At the end of three or four months it comes up again and doubles, and it is difficult to handle business in that way. For passenger business it is ideal.

Mr. C. H. Quereau—I am willing to be quoted that the percentage of total delays due to the motive power department on most roads west of Chicago, including hot boxes on cars and all failures of cars as well as locomotives, will not exceed 12 per cent. of the total delays. I believe the pooling system secures an even distribution of pay and an even distribution of rest. It is impossible to secure this by any other system so well as by pooling.

Mr. Deems—Within the last month I had an opportunity to look over a report made to a large Western road in which the mechanical department in its monthly report took into account every delay. It showed the percentage of delays incident to different causes, and those incident to engine failures were 1 per cent. I think information of that kind should be kept by every road.

Mr. Rosing—We find the delays due to engine failures will average between 1 and 2 per cent.

UNLOADING LOCOMOTIVE COAL PRIOR TO BEING UNLOADED ON THE TANK.

(*See Railroad Gazette, June 21, page 429.*)

Mr. G. W. Rhodes—There is one thing about coal wharves that I think sometimes we overlook, and that is the location. The location when we had 100-mile divisions was always at the roundhouse. With the improved mechanism and the improved methods we have for getting continuous mileage out of our engines, the one thing that interferes with mileage is locating the coal wharves at the roundhouse. You get your through train moving, the engine is in perfect order, and there is nothing to prevent going along on another division excepting that it is out of coal, and disconnecting the engine and backing into the house to get coal interferes so much with the movement of the train that it prevents our getting as much mileage as we ought to. I believe that nowadays the heavy coal wharves ought to be located on the main line, and that the coal wharves at the roundhouses ought to be minor matters for switch engines, and the bulk of the work should be put on the main line. On many roads that is what they are doing now.

Mr. W. H. V. Rosing, Illinois Central—To me the essence of the report is in the opinion of the committee that the expense of coaling engines is governed entirely by the kind of cars in which the coal is handled. We have three styles of coal chutes on our road, one being the old-style incline, another being the kind of chute where the cars are pushed up an incline, but where the incline leads up 6 ft. higher than the top of the pockets of the chute. The coal is then dumped from the bottom of the cars on to a platform and then shoveled into the chute. The handling of the coal is thus reduced 40 per cent. We also have a style of chute operated by link belt machinery and conveyors, and while this chute requires less room and less property than the ordinary chute with an incline, we find that unless we have a large supply of dumping cars it will cost us more by that system of handling the coal than any other, due to the increased expenses of the cost of repairs to the machinery, to the conveyors, etc., along with the cost of the engine to operate the plant.

Mr. A. M. Waitt, New York Central & Hudson River—I had a list drawn up for me before I came to the convention showing the number of tons and the cost per ton of handling the coal at various points on our line, and was very much surprised to find an almost alarming difference in cost between the very ancient methods, a few of which still remained, and the more modern method of handling coal. The difference was from 1.4 cents per ton up to 41 cents per ton. Two years ago, when I first went with the New York Central road I found that on the West Shore side of the river that the coal handling methods were of the most primitive kinds. At some of our large points where we had to handle large quantities of coal it had to be done entirely by shoveling. For instance, the cars would come in, the coal would be shoveled down on the platforms on a level with the ground, and then would be shoveled to make room for another car of coal. When you wanted to coal the engine up, many times it had to be handled a second time. Then you can see very readily how the expense would run up in the vicinity of 30 or 40 cents a ton. The style of coaling plants, it seems to me, depends very much on local conditions and on the room. It is a fact in the East, if not in the West, that in many of our yards the space is very limited. For that reason mechanical coaling plants where no inclined trestle is used seem to be a necessary feature. Everything is put into small compass. Of course, with those there is no small amount of mechanism which has to be maintained, and which may get out of order. The cheapest method that is used on the New York Central and the one that is preferred where we have room, is the ordinary inclined trestle where the cars can be pushed up with the switch engine and the coal unloaded from the bottom of the cars, the cars being preferably hopper-bottom cars, and have it distributed as it may be wanted in the chutes on one or generally on both sides of the center of the track. When the engine wants coal all that is necessary is to pull down the slide of the chute over the hopper and then put it back and check the flow of coal. This is being done on the Central without weighing, and in handling the coal by this method we come down as low as 1.4 cents per ton. It seems from the experience that I have had and the figures that I have been able to collect on our road and some from other roads, that the most economical plan where room is abundant, is the trestle of the kind I have described. Where room is lacking then one or the other of the mechanical plants seem necessary. As to which is the better of those, I cannot say. We are using on the Central in contracted places quite a number of Link-Belt plants, and there is quite a rivalry between the different plants as to the economy which can be produced in the handling of coal. Of course, where small quantities of coal are handled there is an opportunity for considerable variation in cost, because a few hundred pounds, more or less, will make quite a difference in the average when only two or three men are at the plant, but we find in these mechanical coaling plants the best records are as low as 3.26 cents per ton. They run from that up to five, six and sometimes seven cents, where the plant is just started, but we are aiming to bring that down to less than four cents.

Mr. F. A. Delano—I was on a committee that had a discussion of this subject for our road, and we came to the conclusion that the most satisfactory chutes for large quantities of coal are what are described in the report as the Erie chute, but we have some rather interesting and difficult problems in connection with that. In the first place to raise the car high enough that the coal would flow from the car directly into the large pocket, which is a storage pocket as well as a supply pocket, and from it to the engine, required that the track should be some 36 ft. above the main line. That extreme height required a very long trestle to work within the limits that we thought was possible for a switch engine; a 6 per cent. grade is what we have been using for such a long incline as that. Another difficulty was that sometimes in dumping a large car of 40 tons, you might only want to put a small quantity in some of the chutes. Some of the other chutes might be full. Another difficulty was where we were cramped for room we had to get some other means of getting the car up this great height. The first suggestion was that we should use a wire cable. We found that it would take a very large cable, and that the overhaul of the cable when the car was let down produced some great difficulties, and the best suggestion that was made, I think, in view of that was that an especially designed locomotive with rack connection between the rails should be used to get the car up the incline, and in that case you have got to use an incline of 25 or 30 per cent. Another difficulty that we have in the West is that a great deal of our coal is mined very large, the lumps weighing a half ton sometimes, and they are hard to break. Now, in the present chutes we require the coal to be broken as it is handled. We hit upon the plan of using bars laid on edge, 1 in. x 5 in., and spaced 4 or 5 in. apart, and the coal drops on those bars, and is broken with a maul before it drops through, all the fine coal dropping through without any labor. We also ran against the difficulty of getting the weight of the coal. Our present method, the Williams-White chute, is guesswork on the part of the coal chute man. They measure the chutes, and they have marks on the side of them, but we find great inaccuracies in the amount of coal delivered to engines, these running up as high as 1,500 lbs. on the delivery of 30 or 40 tons of coal. What seems to me a most satisfactory way is one we have inaugurated, and that is to have a scale 20 ft. long at each end of the coal chute. We weigh the tender loaded and empty, and in that way we get the ticket for the actual amount of coal taken. It is a very cheap way. We have been using this for over a year. The scale should be put in strongly and on good foundations, because it has heavy service. The engines pass right over the scale, and there is no dead rail at all. But we can make a good scale in 20 ft.; it is not so difficult as making a scale for 35 or 50 ft.

Mr. A. E. Mitchell, Erie R. R.—We have on our line all kinds of coal trestles and coal stations from the bucket to the incline and the mechanical link belt. We have in Jersey City and Port Jervis the link arrangement. By this arrangement we are able to mix the fine anthracite coal such as washed coal, and Birdseye and barley, with any size of bituminous coal we require. Our mixture is composed of 70 per cent. of washed fine mixed with about 30 per cent. of soft coal, which enables us to burn a mixture on our engines which is very economical, costing 50 or 60 cents a ton. The object of using the bituminous coal is to produce a coke which prevents the fine coal from passing through the grate. The cost of handling coal varies from 3 cents to 9 cents a ton. We have, however, in the anthracite region, an incline operated by one man who houses the coal by means of a gas engine, and it takes about ten minutes to get the car of coal up the incline. At the same time this one man is able to keep the coal bins full, so that we get all the coal we require.

INDEXING OF THE PROCEEDINGS.

Mr. Delano—Your committee thought that the best report they could make would be to bring in the index itself. The index is printed, and they will be sent to all the members by the Secretary, but I am sorry I cannot exhibit a copy here. I will say that the work was done for the committee by Mr. George L. Fowler, a member of the association, and very thoroughly done, the index, of course, being a complete index for our en-

tire proceedings. There are some 38 years, if I remember, and it makes a volume of about 200 pages.

On motion the report of the committee was received, the committee discharged, and the thanks of the association tendered to the committee, Mr. George L. Fowler, and Secretary Taylor for the excellent work they have done in the preparation of the index.

AN UP-TO-DATE ROUNDHOUSE.

(See Railroad Gazette, June 21, page 427.)

Mr. G. W. Rhodes—Some time ago for Northern work I used to be in favor of a flat roof for a roundhouse, and did not object to carrying it on posts. But having had quite a little experience with these flat-roofed roundhouses, I am disposed to think, especially in northern territory, that it is a mistake to construct a flat-roofed roundhouse. In washing out boilers and with the difficulties which we sometimes experience in getting proper draft through the smoke-jacks, the roundhouse gets so befogged that it is not only very difficult to see how to do the work about the machinery, but it is unpleasant to be in the house. I originally favored the flat roof house, on account of the smaller space that had to be heated, but when we find how important it is to have good ventilation and light in the house, and the fact that there is not much difference in the cost, I think it is open to a good deal of question whether the flat-roofed roundhouse is the proper thing.

Mr. R. P. C. Sanderson—With reference to the report, where it refers to the pits, in my judgment the depth given is a little excessive. The depth of pits usually is too great, and it seems to me it should be just so that a man can stand and work comfortably at the appliances in the cellars of the engines most frequently used, so that the minimum amount of time is lost in changing these appliances. It also frequently simplifies the drainage proposition, where there is no large fall to be obtained in the sewers. With reference to the methods of securing the rails on top of the pits I think it is a good thing to creosote the cross-ties and jack rods that are used there. The cost is small while the annoyance in a busy roundhouse of having to renew these ties and rods on account of decay, which is rapid, is very great.

With reference to the heating the only plan indorsed by the committee is that of using a heated air blast. I think that is all right for the Northern and Western roads, but in a good portion of the South and Southwest the climate is such that the investment in a heating plant of that kind would not be justified, as in a good portion of that territory heat is only required for two or three months in the year. In those cases pipes in the pits, while objectionable in some respects, answer the purpose reasonably well. Another thing I am strongly in favor of is putting the steam pipes in a ring pit around the roundhouse instead of putting them above. It seems to keep these steam pipes from leaking and dripping, which is very objectionable when they are overhead, and the leakage and dripping in the ring pit is not so objectionable.

With regard to the electric lighting of roundhouses, in the recent installation which I had the laying out of, I looked at that matter pretty thoroughly, and went to see some roundhouses which were lighted by electricity, and came to the conclusion that the best plan was to have a circle of incandescent lights, one at each pit, so that the men could see to get around the house, and have at the center, between every pit, a group of six 25-candle power lights arranged with a switch at the outside wall so that they could be thrown on or off as work was needed between the pits and light the machinery thoroughly and yet the current need not be wasted when not needed.

With reference to washing out, having special regard to the use of hot water, I have followed that matter somewhat, but have not been able to get hot water in sufficient quantity, water hot enough to be of real service to wash a big boiler thoroughly and keep the washing business going all the time, as in a busy roundhouse, where the men would go from engine to engine. It is not a difficult matter to furnish enough hot water to fill the boilers with hot water, and it is not difficult to cool the boilers down and let cool water run in as the hot water runs down and reduce the temperature gradually so that the boiler can be washed without detriment with cool water. But all the steamers I have seen for furnishing hot water would not furnish enough to wash the boilers, say, with a ⅜-in. nozzle under a good head of pressure, and keep the business going.

Mr. W. H. V. Rosing—With regard to the water and blow-off piping, I notice the committee states that the blow-off pipe from the top of the dome should be connected with short pipes from the roof, but over the pit. We have pipes from each pit, but they connect with a pipe running around the house, but on account of the slight success of washing boilers with hot water through the ordinary pipes we have connected with each of our large roundhouses a sump of about 25 x 30 ft. and about 30 ft. deep, and blow the steam directly into the water in the sump from the engines. In washing out the engine we blow off the steam first, and the water then is let out into the engine-house pit, but the blow-off of steam goes into the sump, and will heat a large body of water to 110 degrees, which is as hot as any man can bear in handling it. A suction pipe is connected with this sump, and therefore we have plenty of water for washing out as well as filling boilers.

In our last roundhouse we have put in but one light, of 100-candle power, placed in relation to the smoke-jack, so that the light will shine under and into the engine. That gives a 100-candle power light on each side of each engine, and in cold weather the engineers can conveniently oil their engines without the use of the torch. There is not much saving in dispensing with the torch, but I mention that to show that the engine is well lighted underneath.

Mr. R. D. Smith, Chicago, Burlington & Quincy—The committee makes a strong recommendation for the electrically operated turn-table. I would like to know the reason for this, as it has been my impression that electric motors are more expensive to operate than motors using gasoline or steam. I should have been glad to have heard what size motor the committee would recommend to operate an up-to-date turn-table carrying an up-to-date locomotive. This matter of horse-power of turn-table motors is, I think, quite an important one, and in my investigation of this matter I have found turn-tables operated with motors varying all the way from 19 to 5 h.p., with practically the same length of table and turning the same weight of engine.

Mr. C. M. Quereau—The committee's recommendation that the engines should head into roundhouses of modern type seems to me a decided advantage. There is another advantage in heading engines into the roundhouse, and that is that it is frequently necessary to disconnect the tank from the locomotive in order to do work on the tender itself or on the locomotive. If the engine is backed in, it must either stand outdoors, where it is difficult to work on it, or the tank must be backed toward the outer wall, which cramps the passageway for the workmen. If the engine is headed in, the tank may be backed outdoors without any disadvantage to it, and you still have all the room in the roundhouse.

I have seen a roundhouse lighted by electricity employing a method not mentioned by the committee. They have drop lights between the engines and an extension light by which the man working can put the electric globe as close to the work as he wishes. If it is a light hung from the roof, he may get into such a position that a shadow will interfere with his work. If the light is in the form of a bulb on an extension, protected by wire, he can put it where he wants it.

I know it is the general opinion that it is desirable to wash out boilers with hot water. I am inclined to believe that is a mistake, and if the question is looked into there will not be so many advocates of that method. With a boiler carrying 165 lbs. pressure, the water in it is heated to a temperature of 365 degrees approximately. The higher the pressure of the steam, the higher the temperature of the water contained in it. I believe it fair to assume that the water used for washing would have a temperature averaging about 50 degrees as delivered to the boiler. If the water is heated above 110 or 120 degrees, it cannot be handled comfortably by the men who wash out the boilers. We have, therefore, added to the temperature of the water only 50 or 60 degrees of heat, when, in order to accomplish proper results we should add 200 degrees approximately. I doubt very much if the additional 50 degrees in the temperature of the water used in washing out boilers is going to make any material difference in the rapidity of the contraction of the sheets of the boiler, if that is the result we wish to avoid. Even if there was some gain to come from heating the water to a temperature of 110 or 120 degrees, I believe a little investigation will show that the cost will be prohibitive; that is the cost of heating the water, compared with the saving which would be gained by a less damage to the boiler. It is a question which is worth careful study and analysis, and my impression is there is a great deal less in it than commonly believed.

The wisest thing to do in washing boilers, in my opinion, is to use water at an ordinary temperature, allowing it to enter the boiler as the hot water flows out, gradually reducing the temperature of the water in the boiler, and just before firing up filling the boiler with hot water.

Mr. J. F. Deems—I observe the committee recommends the use of brick floors in roundhouses, which I think is all right; but I want to call attention to a case where a machine shop and erecting shop had been floored with vitrified brick, and as time went on they became smooth and oily. The men gathered up pieces of carpet to lay over the brick floor, and it was stated in some instances that the men refused to work on the brick on account of its being slippery. I do not think it would be so bad in the roundhouse, as there is so much water used and the oil is washed off.

Mr. F. A. Delano—We have on our road an interesting example showing how opinions have changed on this question of roofs. The roundhouse on one of our divisions, built more than 45 years ago, originally had a flat roof. Some 20 years later, when it was necessary to repair the roof, the flat roof was taken off and a peaked roof put on. We are now talking of replacing it with a flat roof. The trouble we have found with a peaked roof, and which I should like to have Mr. Rhodes explain a little, is in the matter of ventilation. We have ventilators in the peak of such roundhouses, and instead of acting in the way we wish them to do, about nine-tenths of the time the cold air has a contrary desire to go down the ventilator instead of allowing the steam and smoke to issue up. With a fan blower system we could probably help matters very much by producing enough of a current to keep the air going outwards through these ventilators in the peaks of the roofs. That is the principal reason why the peaked roof roundhouse has been found objectionable.

The report of this committee does not say anything about painting or whitewashing roundhouses. I believe that is an important matter. If roundhouses are frequently whitewashed you will find it will add very much to the light and cleanliness of the house. The use of white glazed brick, or nearly white, on the inside of a house would also accomplish much in securing light. The cost of these bricks has been reduced, and in building a house in this way on the inside you would get a coating which would reflect the light, and would not need painting thereafter.

Mention has been made of blowing down the steam from the engines and using the steam to heat the feed-water or washout water. I think in addition to the actual economy of this process, there is a further argument in it; we do not let the steam escape in the house, which latter is very objectionable. If for no other reason, the engine should be equipped either with a globe valve in the whistle pipe, as is the usual practice, or with a separate connection from the dome. There is another advantage in such connection. The water can be admitted through the check, and the hot water allowed to flow out from this dome connection. One of our master mechanics discovered that in the ordinary method of letting the water escape from the boiler through the foot-cock, that it took about an hour and a half to one hour and forty minutes to cool the boiler down, and even then the top part of the shell would remain very hot. Apparently the cold water entering at the check would not thoroughly mix with the hot water in the boiler and settle down, but would run out, leaving the hot water upon the top sheets of the boiler. While letting the hot water escape from the dome he was able to reduce the time required for cooling down the engine to 40 minutes; completely cooling down all parts of the boiler. The connection can be used for letting the steam blow out and of letting the hot water run out when you are washing out.

Mr. W. H. Marshall, Lake Shore & Michigan Southern—I had some experience a few years ago with an overhead blow-off pipe for blowing the steam from the engines. If I remember correctly, the pipe was 3 in. in diameter, but it was useless because it delayed the blowing down of the engine. In the new house we put in a 5-in. pipe, and we thought we had it large enough. When I read the recommendation of the committee that the vent pipe be placed as they describe, it occurred to me it would be just the thing. We found if an engine comes into the house with a high pressure, the first part of the blow-off is all right in a 5-in. pipe, but when you get down to the last of it, it goes out slowly, particularly if the steam goes through any length of pipe. We found that an engine blowing into a 5-in. pipe is delayed 20 minutes longer than it would be if it blew straight into the air.

I was interested in the remarks made by Mr. Rhodes on the shape of roofs, but it occurred to me that a great deal of the apparent difference between the two forms of roof is due more to ventilation than to the actual change in the shape of the roof. Two of the worst ventilated houses of which I have knowledge have the peaked roof. One of them was the roundhouse at Collington, which was replaced by the excellent plant they have recently installed there. In both of the roundhouses in question the ventilation was very poor, and I have no doubt that better results would be obtained if the ventilation had been changed regardless of the shape of the roof. In this roundhouse we place between each two pits three 32-candle power incandescent lamps.

Mr. H. J. Bentley, Chicago & Northwestern—During the twelve months we have been in our new roundhouse at Clinton, Iowa, we have discovered a lot of mistakes we have made, and if we were going to build another roundhouse we would make some changes. The hipped roof has been adopted in place of the flat roof. I do not think we would put our water pipes, steam pipes and other pipes overhead, but would, as the committee suggested, place them in an annular pit going around the house. After the water pipes had been up a short time, we found that the water from condensation was dripping from the pipes on the engines, and the foremen were complaining that the engines were in a dirty condition, and we put some galvanized iron drippers underneath the pipe to carry the drippings to the post. When that house was built provision was made for a large amount of what might be called additional lights. Lights in the doors and through the doors and windows, everywhere except the roof. Even with the additional light we find we are in the dark at certain times of the year, and we would recommend any change that would increase the lighting of the house either from the roof or in any other practical way. The ventilation of a roundhouse is very important. In our old house we had a peaked roof, but there was no ventilation in it. The same thing happened in the new roundhouse at Clinton. We did not have sufficient ventilation to take care of the gases arising from the engines; we cannot have too much ventilation in a roundhouse.

Another mistake is putting the blow-off pipes in the roof, for blowing the water and steam out of the engine. With our system of piping we cannot lead the water to go upward. If we had blow-off pipes in the annular pit the water would flow by gravity. One of the gentlemen spoke about piping for gasoline or gas. We have a movable gasoline tank by which we heat our fires and take them off and put them on. Our electric turn-table motor has been in operation six months, and during that time it has given very excellent service. It is a 10-h.p. motor, and by its use we simply have one man to operate the turn-table. He signals the engines on the table, turns them and signals them off. Another man opens the

doors and puts the engines under the check. By the use of the electric motor we have been able to reduce the service to the extent of two men at night and one man during the day.

I am in favor of eliminating the use of wood wherever possible in a roundhouse. The drop pit in the Clinton roundhouse is something dissimilar from anything I have seen, in so far that the driving wheel pit and the engine truck pit are both operated by the one jack, which is of the hydraulic pattern. Whenever it is necessary to drop a pair of drivers and the jack is under another engine, we transfer it on wheels from one pit to the other. I think the hydraulic jack is better than the pneumatic jack on account of its rigidity, the pneumatic jacks being springy and uncertain. I wish the committee had been in existence, and made this report before we built our roundhouse as we would probably have adopted some of their recommendations. They say an electric light should be located over the center of the turn-table. I think it is necessary for some illumination to be located there. We have extension lights kept in the storeroom all the time for use under the engines, and there is no doubt they are much better and safer than the torch. I cannot agree with the use of cast iron jacks, as those in use are very unsatisfactory; it is very unusual to find them in order.

TOPICAL DISCUSSION.

Material for Hub Liners on Cast Steel Driving Wheels and on the Faces of Cast Steel Driving Boxes.

Mr. D. F. Crawford, Pennsylvania Lines—This is a subject upon which I can say very little, for the reason we have only used one material, phosphor-bronze. We have engines weighing 140,000 lbs. on the drivers, cast steel driving wheels and cast steel driving boxes. Our method is to screw up the hub, turn it to form a dovetail and cast the ordinary phosphor-bronze mixture on it, after which it is turned. We do not use any facing on the boxes. These engines, of which we have 35, have given us less trouble than any other class of engines we have on the Northwestern System from the heating of driving boxes. They are ten-wheelers, and I do not recall but one or two cases of hot driving boxes in over a year's use, and I think they will be very successful. Some time ago we attempted to fasten the hub liners on with copper screws with a screw-driver slot, but as the liner wore down the hubs wore off, and the liners became loose, and we abandoned them. All of our steel driving wheels have the phosphor-bronze hub liner on them.

Mr. C. H. Quereau—We have had some experience on this subject which may be of benefit to others, especially in our engine truck liners. We use tin, pure tin, and we fasten it on to the boxes by counter-sinking on the seat to which we wish to apply the tin and then drive in at intervals of 2½ or 3 in. soft brass pins about ¾ in. in diameter; driven in solid and upset, and the tin is cast around these soft brass plugs. Without the use of plugs, although the tin while in place gave satisfactory results as to wearing and non-heating qualities, it would gradually shake off, become loose and be lost. By putting in the soft brass plugs the tin will wear down to a thickness which makes it necessary to remove it on account of too much lateral motion. We tried phosphor-bronze, and we thought it was more labor, even to apply them, than to use the tin. I do not mean tin babbitt; but pure tin.

Mr. Roberts—I ask Mr. Crawford if they use anything on the shoe and wedge face of the steel box, and if they use the cast iron shoe and wrench?

Mr. Crawford—No, sir; we do not use anything on the shoe and wedge face. We use the phosphor-bronze shoe and wedge.

Mr. P. H. Minshull, New York, Ontario & Western—We have been using steel boxes, and make a counterbore on the face of the box and fill it with babbitt to a depth of 1-16 in. We have been using steel boiler plate for hub liners on the wheels, and find we reduce the wear and have had very little trouble with hot boxes.

Mr. O. Stewart, Bangor & Aroostook—In our large engines, when we first received them, they were lined with babbitt. This gave but poor service. They lined both the box of the wedge and the shoe and the box of the hub. We were compelled to remove them and put phosphor-bronze on the box. We put the box in a lathe, turned it up and put the bronze plate on, bolting it and inserting the heads of the bolts about 1 in. lower than the plates. We have not had one get loose, they have given satisfaction, and the cast iron shoe solid against the steel box has also given satisfaction.

Mr. W. McIntosh—In my opinion the most simple way to provide for wear between the hub of steel driving wheels and steel driving boxes is to provide a proper recess in the box and clean it up in the lathe so that it can be tinned and faced with a good quality of babbitt metal. A box treated in that manner will last as long as the wheels will remain under the engine and give good service. The bronze lining placed on the hub of the driving wheel will also give good service, but they are more expensive to apply and renew. As to the shoe, we find that a cast iron shoe against a steel driving box will work very nicely provided there is a reasonable amount of freedom allowed between the flanges of the box.

Mr. David Brown—The bronze and the babbitt are all right, but I do not see why good cast iron is not as good as either. If the wheel is properly prepared to receive a cast iron liner, it is a pretty hard material, much harder than the brass and babbitt. The babbitt, if it got into trouble, would be apt to run out. The cast iron liner can be put on whole before the wheel is put on. If it has to be replaced at any time, as the hub wears down, we put it on in two halves, which gives good result. As regard the box and the wedge we never expected trouble from them, and the reason is we always give them plenty of motion, allowing the box to roll in the wedges.

Maintenance and Lubrication of Metallic Piston Rod Packing.

Mr. D. Van Alstine, Chicago Great Western—My reason for suggesting this topic for discussion was to ascertain to what extent roads are having trouble with metallic piston rod packing, and what has been done to remedy the trouble. A limited inquiry leads me to think that packing in heavy high-pressure engines is a considerable item of expense, and the result is not very satisfactory. Some of the principal causes of packing blowing are probably as follows, viz.:

1. Poor lubrication, due to pooling engines, by which engineers are less careful, or inefficient cups or swabs.
2. Piston valves with insufficient relief valves for getting rid of water in cylinders.
3. Large piston rods, which through unequal lubrication on opposite sides of the rod, furnish greater leverage to spring the packing open.
4. Insufficient play of the vibrating cups in the stuffing box to allow for wear of cross-heads in guides and piston in cylinders.
5. The angle of the packing in the cups too acute.

The most important of all these is, in my opinion, poor lubrication, and it seems also the most difficult to control. Feed cups are unsatisfactory, especially where a pipe has to be used to carry the oil to the swab, and swabs become glazed or are blown away from the rods by leaking steam.

Something of a more adhesive nature than ordinary lubricating oil seems desirable, and we are experimenting with hard grease with some prospect of success, but cannot say positively as yet what the result will be.

From observation and inquiry the following points appear to me to deserve especial attention:

1. Lubrication.
2. Sufficient clearance of packing cup in stuffing box, say, ¾ in.
3. Correct angle between packing and cup.
4. Packing cup a close fit to the rod.
5. Proper alloy and packing rings finished.

Mr. F. M. Whyte—Some tests are being made to ascertain if it is necessary to lubricate the packing, and while I believe the tests have not been reported, the indications seem to be that the packing does not need to be lubricated. If it does need to be lubricated, the lubrication must be applied on the packing inside the piston, so that the leakage of steam will blow it on the packing rather than to apply the lubrication on the outside and have the steam blow it from the packing.

Mr. J. A. Graham, Cleveland, Lorain & Wheeling—In regard to running the packing without oiling, I tried that on one engine, and found the packing only ran a very few trips before it had to be renewed.

Mr. Charles Graham, Delaware, Lackawanna & Western—I have tried running the metal packing without oil, and made up my mind it was a failure, as the packing would wear rapidly, and had to be renewed often. I tried it on one engine, and after giving it a fair trial without the lubrication, put the oil cups on again and gave it lubrication, and found that the packing lasted a much longer time than it did before. I am pretty thoroughly convinced that the way to add life to the metallic packing is to have better lubrication.

Mr. J. L. Lawrence, Cumberland Valley—In connection with this matter of metallic packing, we should be careful to get the proper metal for packing rings. We have tried three or four different mixtures, and while none of them did very badly, they were not as good as we would have liked to have them. We finally made a test and equipped a switching engine on one side with our regular formula, and on the other side made rings from Magnolia metal. We sent the engine out to work. Both valve stems were a little out of true, which gave each kind of rings the same chance. We have removed our own formula of packing rings three times, but the Magnolia has not been removed, and we are beginning to think very seriously that we have struck about the best kind of metal for metallic packing rings. I think the question of lubrication could hardly be dispensed with satisfactorily, and if we get good metal to make our packing rings from we will have better results.

Mr. McIntosh—I fully indorse Mr. Whyte's suggestion that the oil for lubricating packing should come in contact with the piston rod inside of the cylinder. We know that 90 per cent. of the oil put on the piston rod outside of the cylinder is blown away. We all understand that the usual methods of lubricating piston rods are entirely unsatisfactory. There is either a swab hung there full of grit and dirt, or some kind of a cup full of dirty and gritty waste, only renewed at long intervals. I think it would be economy for the railroad company to apply some simple, positive feed lubricator to piston rods. I believe economy would result from the use of such a device, especially on our large engines.

The convention then proceeded to the election of officers, with the result as announced in the beginning of the report.

M. M. Association Excursion to Schenectady.

On Friday, June 21, the Master Mechanics' Association in convention at Saratoga, N. Y., accepted the invitation of the Schenectady Locomotive Works, to visit Schenectady. A special train was provided by the Delaware & Hudson, which left Saratoga at 2 p. m., luncheon being served at the locomotive works. Between 150 and 200 took advantage of this opportunity to see these fine shops.

The Schenectady Locomotive Works now have under construction a new blacksmith shop 400 x 125 ft., and a forge shop 365 x 85 ft. These are being equipped with the latest tools and appliances for handling materials, and the ventilation is receiving special attention.

A new power station has just been finished and 1,800 h.p. of boilers has been installed and space is provided for an additional 1,800 h.p. boiler plant. Coal and ash conveying appliances and automatic stokers are used. The stack is brick, 10 ft. in diam. inside and 200 ft. high. A compound Corliss engine of 500 h.p. direct-connected to an electric generator is now in place and furnishing power for 16 electric traveling cranes, besides various motors driving shafting and tools. Lighting generators, air compressors, hydraulic pumps, etc., are being installed.

In the erecting shop it was noticed that most of the locomotives building were being equipped with wide fire-boxes. The shops are full of work and the whole plant was in full operation. The trip was an enjoyable one and much appreciated by the association.

The Master Car Builders' Reports.

Abstracts of certain of the reports of the committees of the Master Car Builders' Association appear below and others, together with abstracts of the discussions, will follow in a later issue.

TRIPLE VALVE TESTS.

During the year an air-brake valve known as the "Hibbard"* has been submitted to the committee for test purposes on the Association's rack at Purdue University, La Fayette, Ind. This valve is owned by Chicago interests. Fifty valves were delivered to the committee at the University, applied to the rack and made ready for test, those interested in the device having first been given an opportunity to thoroughly prove the device themselves, making such readjustments as seemed advisable. . . .

A summary of the tests is as follows:

Test No.	1.—To determine power of service brake....	Meets requirements.
" "	2. — Development of power and measurement of time in emergency service..	Fails in the 55 lbs. pressure requirement in 3½ seconds by .196 of a second in the first series of three tests, and by .076 of a second in the second series of three tests.
" "	3.—Jumping Test.....	Meets requirements as far as jumping is concerned, but fails in the time requirement on the 50th car.
" "	4.—(a) Graduating Test.	Meets requirements.
" "	4.—(b) Graduating Test.	Meets requirements.
" "	5.—Disk Test—Service.	Meets requirements.
" "	6.—Disk Test—Emergency	Failed in requirements.
" "	7.—Holding Test—Service	Meets requirements.
" "	8.—Release Test	Meets requirements.
" "	9.—Time Charging Reservoir	Failed in requirements.
" "	10.—Service followed by quick action	Meets requirement as far as quick action is concerned, but failed in the time requirement.
" "	11.—(a) Extra — Mixed Train Test of Application No. 1.....	Results entirely satisfactory.
" "	11.—(b) Extra — Mixed Test of Application No. 2	Results entirely satisfactory, including time requirement.

Conclusions.—It will be observed that while, under a strict accounting, the Hibbard valve failed in four of the 12 tests it was subjected to, there was but one class of failure, excluding the minor test of time charging reservoir to 70 lbs., namely, the *time record*, and that in the No. 2 test this failure only amounted to a small fraction of a second, so small indeed that it had to be measured by electrical recording apparatus, the combination of stop watch, gage and observer's eye not being quick enough to determine the differences. The advantages of the disk test for measuring the range of service application and the range of emergency application was as well illustrated. No. 6 test was a surprise and disappointment to all those who had witnessed the fine performance of the valve in all other respects. The inventors of the valve feel confident they can reproportion the parts so that the emergency action will follow service action with the $^{5}/_{64}$ limit called for in test No. 6. When this is accomplished it is believed that the Hibbard valve will easily meet all the requirements of the Association's code. The committee feels that it cannot commend too highly the action of the owners of the Hibbard valve in submitting their device for criticism and test before putting them on the freight cars of the country.

The wisdom of installing the Association plant at Purdue University was well demonstrated in preparing, arranging and conducting the tests. The committee is under many obligations to Profs. Goss and Smart, to Mr. L. V. Ludy, instructor in the Engineering Laboratory, who had the immediate supervision of and who compiled the chronograph and recording apparatus records; also to students Hays, Grimm, Buenting and Meddis for valuable assistance rendered, and to A. J.

*Described in the *Railroad Gazette*, August 10, 1900.

Cota, Master Mechanic, Beardstown, C., B. & Q. R. R. Co., who handled the engineer's valve throughout the tests.

This report is signed by G. W. Rhodes, A. W. Gibbs, W. S. Morris, J. O. Pattee, and W. McIntosh.

LABORATORY TESTS OF BRAKE SHOES.

At the last convention, the committee was instructed; first, to make tests of any brake shoes that might be submitted to it by any railroad company belonging to the Association; second, to present a specification for adoption as standard by the Association which would cover the essential and most desirable features of a satisfactory brake shoe for steam railway purposes. The shoes submitted for test and tested were as follows, the number opposite each one being the laboratory number and the number by which each shoe is designated.

Shoe.	Laboratory Number.
Lappin	47
Sargent U (Broke)	48
Streeter	49
Corning	50
Herron	51
Cardwell	52
Ideal	53
Cardwell	54
Sargent U	55
Composite	56
Diamond S	—
Diamond S	—

Note.—Tests of Diamond S shoes could not be completed in time for printing in the report.

The results of the tests are given in the report in full from which Table I has been compiled. These averages only are shown. Table II contains notes concerning the action of shoes under test.

Table I.—Average Results of Brake Shoe Tests.

Name of Shoe.	Coefficient of Friction—Per cent. Mean. Steel Wheel.	Mean. Chilled Wheel.	Initial. Steel Wheel.	Initial. Chilled Wheel.	Final. Steel Wheel.	Final. Chilled Wheel.
Braking pressure, 2,808 lbs.—Speed 30 miles an hour.						
Lappin	28.5	29.8	29.9	35.1	36.1	35.8
Streeter	27.2	20.3	38.2	23.7	31.5	24.7
Corning	15.5	17.1	18.2	20.7	22.4	24.4
Herron	22.7	21.7	29.1	28.6	30.7	29.6
Cardwell	30.6	31.2	38.6	38.7	34.9	36.6
Ideal	18.3	17.4	23.5	21.2	25.0	25.0
Cardwell	25.9	29.4	29.0	33.3	30.0	35.0
Sargent U	18.2	18.5	21.6	22.3	28.4	27.7
Composite	20.4	29.4	22.5	31.5	32.5	34.6
Diamond S	21.9	22.4	24.2	22.7	38.6	32.2
Diamond S	22.3	25.5	24.5	28.9	33.5	32.4
Braking pressure, 2,808 lbs.—Speed 40 miles an hour.						
Lappin	21.1	27.0	25.6	35.4	31.6	34.0
Streeter	23.2	17.4	39.4	22.3	29.0	24.2
Corning	15.9	16.6	20.8	21.3	23.2	27.1
Herron	22.6	19.4	30.4	28.3	31.2	29.4
Cardwell	26.5	25.6	40.2	36.3	34.0	34.0
Ideal	16.1	20.1	25.1	25.6	24.5	28.9
Cardwell	20.3	29.5	26.7	35.2	27.2	34.3
Sargent U	18.4	17.7	21.8	22.2	32.9	29.7
Composite	20.0	28.3	27.1	32.8	30.7	33.0
Diamond S	20.5	22.4	21.1	23.7	33.1	33.4
Diamond S	20.8	23.8	26.8	30.1	30.4	32.4
Braking pressure, 2,808 lbs.—Speed 65 miles an hour.						
Lappin	18.7	22.0	30.3	32.5	29.0	31.6
Streeter	18.9	14.8	40.1	24.3	28.9	24.1
Corning	12.1	13.4	18.8	18.2	25.5	26.2
Herron	17.6	16.4	31.7	27.9	28.9	28.5
Cardwell	17.1	18.1	39.9	36.3	29.8	30.9
Ideal	11.4	14.0	16.5	20.4	20.2	20.0
Cardwell	13.0	20.5	29.4	32.7	19.4	32.1
Sargent U	15.3	15.9	19.6	19.7	31.6	29.3
Composite	16.7	19.6	30.9	26.8	27.8	31.4
Diamond S	18.6	19.5	20.7	20.9	31.9	34.2
Diamond S	18.1	19.4	23.2	25.6	29.1	29.6
Braking pressure, 4,152 lbs.—Speed 40 miles an hour.						
Lappin	21.4	25.2	28.3	31.7	28.7	31.9
Streeter	22.3	16.5	33.8	19.8	25.3	22.0
Corning	14.8	12.7	17.7	17.0	21.9	20.6
Herron	18.2	18.2	26.6	26.3	25.8	26.1
Cardwell	23.7	25.8	36.8	32.0	29.7	31.4
Ideal	15.3	17.0	21.2	17.7	22.4	25.3
Cardwell	19.6	27.5	27.2	31.0	25.2	31.0
Sargent U	17.0	15.9	21.8	20.1	31.3	31.8
Composite	21.6	25.8	28.0	28.1	29.0	30.6
Diamond S	17.0	19.0	20.5	22.5	28.9	32.2
Diamond S	17.7	20.5	25.9	28.1	25.2	28.4
Braking pressure, 6,840 lbs.—Speed, 30 miles an hour.						
Lappin	19.7	23.4	22.6	26.0	24.8	27.7
Streeter	24.9	18.3	29.7	19.8	26.2	21.8
Corning	14.2	13.8	16.7	17.2	18.6	18.2
Herron	19.9	19.1	27.1	26.1	23.3	22.6
Cardwell	24.3	23.8	31.1	27.2	26.8	27.8
Ideal	12.5	16.9	13.9	19.1	18.2	22.9
Cardwell	20.1	25.5	21.1	27.3	24.0	28.4
Sargent U	16.7	15.4	18.9	17.8	22.5	22.0
Composite	22.9	25.1	23.7	28.1	26.9	27.5
Diamond S	16.5	17.4	18.0	19.2	23.0	27.4
Diamond S	18.5	19.2	21.7	24.2	23.0	25.2
Braking pressure, 6,840 lbs.—Speed 40 miles an hour.						
Lappin	18.8	22.5	25.0	27.8	24.8	27.9
Streeter	20.5	15.7	25.5	19.5	25.3	19.1
Corning	11.9	11.8	15.7	16.1	17.6	18.3
Herron	16.2	15.6	24.2	23.3	21.1	21.5
Cardwell	18.6	21.9	30.7	28.2	24.2	26.6
Ideal	11.0	15.3	13.6	20.5	16.4	18.9
Cardwell	16.3	24.9	22.1	27.3	21.1	29.1
Sargent U	15.0	14.9	19.3	18.3	22.1	25.0
Composite	20.4	23.4	24.1	25.8	26.3	27.6
Diamond S	13.9	15.3	17.4	18.8	21.6	25.8
Diamond S	15.9	17.6	21.0	24.8	20.6	24.6
Braking pressure, 6,840 lbs.—Speed, 65 miles an hour.						
Lappin	12.9	16.3	22.9	23.9	20.1	22.6
Streeter	13.4	12.4	28.4	17.2	20.3	17.3
Corning	10.7	11.2	14.4	16.4	19.1	18.7
Herron	11.8	12.9	22.2	21.5	19.5	19.9
Cardwell	11.7	13.8	24.9	22.4	20.7	21.9
Ideal	10.9	12.8	18.2	17.5	15.8	16.1
Cardwell	9.5	15.2	21.5	21.5	15.5	24.2
Sargent U	12.0	12.1	16.3	17.2	19.7	22.4
Composite	12.8	16.5	21.0	20.7	19.4	23.3
Diamond S	17.7	13.2	17.5	16.9	19.5	22.8
Diamond S	12.5	14.3	20.0	22.9	18.5	21.0

Reviewing the tests, attention is first called to the great variation in the coefficient of friction between one group of shoes and another, and in comparing the friction of the different shoes it is to be specially noted how the loss in weight compares. It is apparent that the shoes producing the greater friction also show the greater wear, and the committee feels safe in stating that this is the general rule, which may, however, have some exceptions, and may show differences in the amount of wear for any given friction. An examination of the particles worn from each shoe, and samples of the fractured shoes themselves, will give any one an idea as to the causes that have produced the results in each specific case.

The committee has no knowledge as to the origin of the shoes tested, and desires to state distinctly that all brake shoes furnished under similar names may not give the same results as those tested. The committee recommends that the results shown should be regarded more as an indication of what it is possible and practicable for brake shoes made up under the various forms to produce, and that anyone desiring to be assured of getting brake shoes with a specific value as to friction, can only do so by selecting samples from time to time and having them tested, or by learning the physical qualities as developed by the character of the fracture, or by having satisfactory samples of fractured shoes with which to compare.

As to the matter of presenting a specification, it may be stated that a perfect specification should cover:

1. The mean coefficient of friction throughout the length of the stop.

TABLE II.—NOTES CONCERNING ACTION OF BRAKE-SHOES UNDER TEST.

Name of Shoe.	Laboratory Number.	Committee Number.	Area Bearing at Start.	Same in Percentage of Normal Area.	Loss of Weight During Tests on Steel Wheels.	Loss of Weight During Tests on Chilled Wheel.	REMARKS.
Lappin	47	4	41.44	7.96*	6 oz.	5 oz.	Considerable amount of fine scale.
Sargent U	48	8	....	....	....	....	Shoe broke while wearing down.
Streeter	49	11	47.18	95.8	4½ oz.	1¼ oz.	Considerable amount of fine to flaky scale.
Corning	50	14	43.50	99.1	5 oz.	1 oz.	Small amount of flaky scale.
Herron	51	16	47.70	97.7	3 oz.	1 oz.	Small amount of fine scale.
Cardwell	52	18	45.51	94.5	7 oz.	4 oz.	Considerable amount of fine scale.
Ideal	53	19	49.20	100.0	1¾ oz.	3 oz.	Small amount of fine to flaky scale.
Cardwell	54	21	46.00	100.0	16 oz.	16 oz.	Large amount of very fine scale.
Sargent U	55	..	46.50	90.0	8 oz.	3 oz.	Very large amount of fine scale on the steel wheel; same on the chilled wheel, only coarser.
Composite	56	29	48.40	98.0	8 oz.	8 oz.	Large amount of fine scale.
Diamond S	..	..	....	...	....	....	
Diamond S	..	..	....	...	....	....	

*Note.—Side of shoe rounded. Net width during test, 3¼ in.

2. The final coefficient of friction which is taken at a point 15 ft. from the end of the stop.

3. The initial coefficient of friction which is taken to be the highest value obtainable at a point near the beginning of the stop.

Such a specification, however, would perhaps be unnecessarily refined and complicated for practical purposes, and it seems probable that the several factors are so related that a specification covering one or two would insure protection against failure in respect to others. The committee is of the opinion that, to cover the frictional clause satisfactorily, it will only be necessary to use two of the factors; i. e., the mean coefficient of friction for the whole stop, and the final coefficient of friction. The committee is also of the opinion from a review of all the data obtained from the test on the machine, that these results are more satisfactory for purposes of comparison when stops are made from a speed of 40 miles per hour, and for this reason it is proposed to make this the standard speed in the proposed specification, and follow the original practice of the committee in adopting three comparative pressures, i. e., 2,808 lbs., 4,152 lbs. and 6,840 lbs., respectively.

Considering the question as to whether it would be desirable to have a separate specification for chilled and steel-tired wheels, the committee, after reviewing the results, does not feel that such would be warranted. The results indicate plainly that a satisfactory friction can be obtained on either, although as a rule the coefficient of friction obtained on steel-tired wheels is somewhat lower than on the chilled, but inasmuch as the steel-tired wheels are used principally in passenger service, the committee is of the opinion that an effort should be made to keep the coefficient of friction up with a view of keeping the efficiency of the brakes up to a proper point. The committee, therefore, proposes the following specification for a brake shoe having the standard M. C. B. dimensions:

Specification.—Shoes when tested on the Master Car Builders' testing machine in effecting stops from an initial speed of 40 miles an hour shall develop upon a cast-iron chilled wheel, or upon a steel-tired wheel, a mean coefficient of friction not less than:

25 per cent. when the brake shoe pressure is 2,808 lbs.

22½ per cent. when the brake shoe pressure is 4,152 lbs.

20 per cent. when the brake shoe pressure is 6,840 lbs.

The rise in the value of the coefficient of friction at the end of the stop shall be within such limits that the value of the coefficient of friction for a point 15 ft. from the end of the stop will not exceed the mean coefficient of friction by more than 7 per cent.

This specification is based upon the results obtained in the case of ordinary or reasonably hard cast iron such as the "B" shoe of the original tests, and a good quality of composite shoe. It will be noticed that this specification does not place a maximum limit on the coefficient of friction. The committee has omitted this for the reason that it believes it is the desire of the Association to encourage high frictional qualities as well as satisfactory wear. It is found that high and uniform frictional qualities are desirable in that it makes it possible to perform the operation of braking with an expenditure of less work and with lighter and less expensive brake gear. The committee believes that it is undesirable to use a brake shoe that gives a high coefficient of friction at or near the end of the stop, as this results in sliding wheels, and in recommending that the coefficient of friction for a point 15 ft. from the end of the stop should not exceed the mean coefficient of friction by more than 7 per cent., it was intended to exclude only the worst of those that have been presented for test. Finally, it may be stated that as development in the matter of brake shoes continues, it may be found desirable to make some modification in the specification proposed, but for the conditions existing to-day, the committee believes that it is fair and reasonable, and urges all members to pay some heed to the frictional qualities of brake shoes that they may use.

The committee desires to acknowledge the exceedingly valuable assistance rendered by Professors Goss and Smart and the students working under their direction. The committee feels that the Association is to be congratulated upon having its testing machine in the hands of such earnest and capable men.

This report is signed by S. P. Bush, Chairman; R. P. C. Sanderson, and George Gibbs.

A JOINT LIBRARY IN CONNECTION WITH THE MASTER MECHANICS' ASSOCIATION.

As a result of the joint deliberations it is deemed inexpedient at the present time to establish a joint library: First, owing to the expense involved; second, in all large cities excellent reference libraries are maintained, whose facilities are available to all; third, there are comparatively few of our members who would be likely to avail themselves of such a library if established.

This report is signed by J. T. Chamberlain.

UNIFORM SECTION OF SIDING AND FLOORING.

The subject has a very important commercial side as well as a mechanical side and the committee has conferred with the lumber men in various parts of the country, as well as with railroad men and some of the great car building concerns. It has become very evident that if the Master Car Builders' Association and the car builders generally would adopt and use sections for flooring and siding, roofing and lining, which approximated closely as far as rough sizes are concerned, the commercial sizes put in buildings, a reduction in price per 1,000 ft. could reasonably be expected, and orders could be filled more promptly. In explanation of this it is well to say that only a limited number of the large lumber dealers do their own logging and cut timber to the proper size for car lumber. Most of the logging in the country is done by lumbermen, and as quite a considerable proportion of the logs are hewed in the winter, to be brought down by the spring freshets and taken to the mills in the summer, the cutting of the logs is not easy to control. Further, if we used rough sizes that are commercial, and lumber sawed to such sizes when not up to the Master Car Builders' specifications will be valuable for commercial purposes, there will be no loss to the lumber men. Several of the firms with whom we corresponded further stated that if the requirements of the Master Car Builders could be made to better suit the lumber mill practices in current usage, a saving of $1 per thousand could be unquestionably be made in the price. This also refers to the question of using siding and roofing of varying widths as against one uniform width of 6 in., which is commonly used and required by many railroads. While it is true that the wide boards when matched make a saving in lumber on account of less loss by the fewer tongues and grooves, many of the mill men claim that it is not easy to get large quantities of siding and roofing all of one width; others claim that the shrinkage in the wide boards is excessive and frequently causes wide-open joints, which are objectionable. We present herewith recommendations for "flooring, ship-lapped"; "flooring, square-edged"; "siding, roofing and lining," which we think will meet all the suggestions advanced by the lumber men and at the same time will be generally acceptable to the car builders and mill men.

Flooring.—To be of two kinds; square-edged, dressed all over, or ship-lapped, dressed all over, in accordance with the sections shown. In explanation of these recommendations it is to be remembered that the lumber from which this floring is to be made is commercial size, 2-in., sawed in thickness, and ranging from 5 in. to 10 in. in width. For the reasons previously mentioned, the mill men can furnish flooring of random widths ranging from 5 in. to 10 in. in the rough at a cheaper price than they can flooring of one uniform width, and as this 2-in. lumber of the width mentioned is commercial material, that which will not cut to lengths for car builders' work. or does not come up to the specifications required for car building, can be cut and used for other building purposes. The lumber men assure us that the percentage of narrow stuff will be small as compared with the percentage of wide. Of course, it would not be expected that miscellaneous width would be used in the same cars, but as the flooring is run through the mill, the different widths can be stacked separately, uniform widths being used on different cars.

It was suggested from several quarters that the ship-lap should be so arranged that the upper part would be 1 in. thick and the lower part ¾ in. thick, so as to give greater wearing life to the floor. The committee, however, felt that it was better not to do this, because it is desired to have the best surface up, and by making the ship-lap centrally, the best side can always be turned up, and thus made a better looking and better wearing floor, and it is assumed that when the floor is nearly worn down to the ship-lap, the flooring will have to be renewed, as it is then too thin for service in modern, heavy cars.

Siding, Roofing and Lining.—The committee thinks it best to recommend that the same section of material be used for siding, roofing and lining, and that the tongue and groove be placed centrally, so that either side of the material can be used as a face side. The purpose of this is that both at the commercial and railroad mills all the material of this character can be run through the planers and matchers without changing knives. Then it can be assorted according to quality, the best of it being used for siding, the less perfect for roofing, and the poorest quality for lining. By making the tongue and groove centrally we think the roofing and lining lumber can be used with the flat surface out, while for the siding it can be used with the beveled edges out. There is no waste of labor in doing this, because cutting the bevel edges requires a second pass through the machine and does not cost anything additional. This siding, roofing and lining is intended to be made from regular commercial 1-in. sawed stuff, and to be dressed from 6-in. and 4-in. widths to match 5¼ in. and 3¼ in. By accepting material of the two widths and stacking them separately, this lumber can be obtained at a cheaper price and obtained more quickly. We find that it is the practice of many car builders to do this, they using material of one width only in one car, while for roofing and lining the lumber used does not make any material difference. It is true that more nails will be required with the narrower widths, and there will be some more loss with the narrower widths on account of the additional number of joints per car. but the mill men are prepared to furnish the material already matched for less money per 1,000 ft. The mill men claim that it is becoming very difficult to get large quanties of lumber of the right specifications in the greater widths, and it is believed to be wise at the present time to concede this point and agree to accept lumber for siding, roofing and lining made from the rough of the two widths, namely 4-in. and 6-in.

This report is signed by R. P. C. Sanderson, John S. Lentz and W. P. Appleyard.

STANDARD AND RECOMMENDED PRACTICE.

The committee recommends few changes, the most important of which are as follows:

To avoid all danger of the journal bearing striking the rear wall of the box, cut out entirely the inner dust guard wall at the top. This change to apply to all sizes of journal boxes.

It is recommended that the wheel fit of the 80,000-lb. axle be increased from 6⅜ to 6½ in.; that of the 100,000-lb. axle from 6⅞ to 7 in. It seems desirable that the diameter of the wheel seat when axles are new should be ¼ in. more than the minimum diameter allowable, so that the axle will be capable of being refitted with wheels at least three times.

It is recommended that the following items of recommended practice be submitted to letter ballot for adoption as standards: Arch bars and column bolt for 80,000-lb. capacity cars; adjustment of the height of couplers; stenciling of cars and passenger car pedestal and journal box for 4¼ x 8-in. journals.

This report is signed by A. M. Waitt, T. W. Demarest and William Apps.

CAST-IRON WHEELS.

The committee was appointed to investigate and report on the question of locating the inner face of cast-iron wheels to the gage point, and the thickness of metal between the bore and ring core, and to recommend minimum weights for wheels for use under 60,000, 80,000 and 100,000-lb. capacity cars.

First. As to locating the inner face of hub of cast-iron wheels to the gage point. If the outside face of the hub next to the box projects $^{3}/_{16}$ in. beyond the gage point, it will allow a clearance between the face of hub and box of 1 in. in the normal position. The lost motion between the journal, the brass, the wedge and the box is about ⅜ in. The dimensions given above will afford a clearance of at least ¼ in. between the hub and the box, when all the lost motion between the journal, the wedge, the brass and the box is fully taken up. It is the opinion of the committee that this amount of clearance is sufficient and that no good will be obtained by increasing or decreasing this amount of clearance. So far as the templet for determining these dimensions is concerned, the committee is of the opinion that it is not practical to make the templet to locate the hub with reference to the gage point, but that the practical method will be to lay a straight edge across the outside of rim, measuring in $^{15}/_{16}$ in., which will give the proper location of the face of the hub. It, of course, should be determined that the pattern is so made that the wheel is 5½ in. over all between the inside of flange and outside of rim, before the measurements referred to above are taken. This applies to 60,000, 80,000 and 100,000-lb. capacity cars.

Second. As to the thickness of metal between the bore and ring core. It is the opinion of the committee, based on actual experience, that any thickness greater than 1 in. is sufficient, and the committee would recommend that a thickness of 1⅛ in. between the bore and ring core after the wheel is bored, should be made standard for all sizes of wheels. The facts in the case, so far as this committee has information, are that wheels measuring 1 in. to $1^{1}/_{16}$ in. between the ring core and bore, when the core is finished, have given satisfaction, and so far as the knowledge of the committee extends, it does not know of any case of failure of wheels at this point.

Third. As to the minimum weight of wheels for use under cars of 60,000, 80,000 and 100,000 lbs. capacity, it is the impression of the committee that this is intended to refer to wheels used for repairs of cars in interchange. On this basis the committee would recommend that the minimum weight of wheel used for this purpose should be as follows:

For 60,000-lbs. capacity cars	550 lbs.
For 80,000 " " "	590 "
For 100,000 " " "	620 "

These recommendations apply only to wheels used for the purpose of repairing foreign cars, and as to minimum weight which should be allowed. At the same time, as a matter of experience, it is the opinion that wheels of fair quality and of the weights given will afford satisfactory results.

It is also recommended that, commencing Sept. 1, 1901, wheelmakers be required to have the nominal weight cast on them, and the committee recommends the following weights:

For 60,000-lbs. capacity cars	575 lbs.
For 80,000 " " "	600 "
For 100,000 " " "	625 "

The committee would also call attention to the fact that in a number of cases wheel patterns have been increased in weight by plastering on material at points which do not serve to increase the strength of the wheel. but merely to attain in the cheapest way the object of furnishing wheels of a given weight. It is extremely important, in going to a heavier wheel, to have the material so distributed that an actual increase in the strength of the wheel shall be obtained thereby. The report contains four drawings showing two patterns of the 60,000 lbs. capacity wheel, and two patterns of the 100,000 lbs. capacity wheel, which have been in extensive use, and which have given satisfactory results.

The question of quality of wheels is so intimately associated with the question of weight that it is impossible to settle this question without taking both questions into consideration. It is believed, however, that the wheels of the weights recommended, if made of suitable material, will meet all the requirements of the Master Car Builders' test of wheels, and will in practice afford perfectly satisfactory results.

This report is signed by J. N. Barr, Chairman; Wm. Garstang, J. J. Hennessey, D. F. Crawford and Wm. Apps. However, Mr. Garstang does not concur with the committee in its recommendation relative to the minimum weights or the drawing showing changes in flange and location of hubs.

THE CHEMICAL COMPOSITION OF ALL STEEL CAR AXLES.

At the convention held in Saratoga, N. Y., in June, 1900, the question of changing the chemical composition of steel car axles, as outlined in the M. C. B. specifications, was discussed. The point made in the informal discussion held at that time was that the present specifications provided too high a proportion of carbon. The first work of the committee was to correspond with those who had taken part in this discussion, and ascertain their reasons for wishing to decrease the percentage of carbon. The result of this correspondence was that a number of instances where steel car axles had broken, were cited to the committee, with the statement that such axles had been bought in accordance with the M. C. B. specifications for steel axles, at least in relation to the percentage of carbon contained in the steel.

The committee was particular to trace out these cases of reputed broken axles, and found that, although the information given was in entire good faith, a careful investigation showed quite clearly that the axles in question which had broken were not known absolutely to have been made in accordance with the chemical compositions required by the M. C. B. specifications; in fact, it was quite clear that these axles either were not bought under these or similar specifications, or else, if they were, no means had been taken to see that the axles furnished were strictly in accordance therewith. It is therefore clear to the committee that so far as these cases of broken axles are concerned, they do not furnish any evidence that the percentage of carbon allowed in the present specifications is too high.

In addition to the above investigation, the committee has been in correspondence with railroad companies who have specifications for steel axles, or who have used the present M. C. B. specifications and the matter seems to stand, so far as the opinion of those in charge of the car departments on these railroads is concerned, that the percentage of carbon now allowed is not too high, and it is even intimated in some instances that if any change is made it should be in the direction of higher carbon.

There are some railroads that have used axles of steel having a less percentage of carbon than provided in the M. C. B. specifications, and the opinion on these roads is that they have been getting good axles with somewhat less carbon than in the present specifications. However, this is not positive proof that the amount of carbon as now allowed in the specifications is too high. On the other hand, several railroad companies which have gone into this matter quite thoroughly, not only in connection with car axles, but with steel used for other purposes where alternate stresses tend to break the piece, are quite positive that, if anything, the percentage of carbon should be made higher rather than lower. The committee does not feel justified in recommending any increase in the percentage of carbon above that allowed at the present time, but is strongly of the opinion that no decrease should be made, and urges that the specifications in regard to chemical composition shall remain as at present.

In connection with this subject, the committee desires to offer some suggestions having a bearing on the subject of the specifications.

First. As to the location of the borings to be taken from steel axles for chemical analysis. This should be distinctly defined by a diagram as shown in Fig. 1, and the committee would recommend that this be incorporated with the specifications.

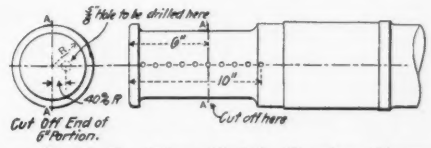


Fig. 1—M. C. B. Axles—Sketch Showing Manner of Taking Borings for Analysis.

Second. The present M. C. B. axles, except of the later designs, have not had their dimensions determined upon the basis of uniform fiber stress between the center and the hub portion of the axle. In order to have uniform fiber stress throughout the body of the axle. it is absolutely necessary that the taper between the wheels should be straight and uniform. It has been found that some manufacturers neglect this possibly due to a misunderstanding of the importance of this point, and the committee would recommend that a notation to this effect be placed on the standard drawing of M. C. B. axles.

Third. It is further thought by the committee that the question of having all steel axles rough turned should be seriously considered. Provision for this is now included in the M. C. B. specifications, but the committee thinks that sufficient emphasis is not placed on this matter by members of the Association ordering steel axles. There is a decided advantage to the railroad companies in getting steel axles turned throughout their length, because it enables the inspector to determine readily whether the dimensions and contour required are strictly followed. It is thought no great opposition will be made to this practice, as the principal manufacturers are equipped for doing this work.

Fourth. M. C. B. axle "A," having journals 3¾ x 7 in., is somewhat small at the wheel seat according to the method followed for the design of axles "C" and "D." The wheel seat of axle "A" should have a limiting diameter of 4⅞ in., allowing ¼ in. to be turned off, the original size should be 5⅛ in. As this axle, however, was designed for cars of 40,000 lbs. capacity, it may not be considered advisable by the Association to make any changes in its design.

Fifth. Axle "B," having journals 4¼ x 8 in., now has a wheel seat 5⅜ in. in diam. The limiting size of wheel seat for this axle should be 5½ in., and allowing ¼ in. to be turned off, the original size should be 5¾ in. The center of this axle is now 4⅝ in., and the committee would recommend that it be made 4¾ in., in order that it shall have the same fiber stress as used in axles "C" and "D." The height of drop in the present specifications for this axle is 34 ft. This is incorrect for the axle having a center of 4⅝ in., but would be correct for this axle having a center of 4¾ in. Therefore, the change recommended will make the size of axle consistent with the specifications, besides reducing the fiber stress, which is now somewhat greater than in the axles of later and more approved design.

Sixth. Axle "C." having journals 5 x 9 in., now has a wheel seat of 6⅜ in. As the limiting size is 6¼ in., it is

thought that the new size should be 6½ in., leaving the axle otherwise unchanged.

Seventh. Axle "D," having journals 5½ x 10 in., now has a wheel seat 6⅞ in. As the limiting size is 6¾ in., it is thought that the new size should be 7 in.

Eighth. In accordance with the designated standards of the Association, axles "A" and "B" are specified for use under cars of 40,000 and 60,000 lbs. capacity. It is only necessary to remind you of the fact that an axle is designated for carrying a definite weight to make it plain that the axles of the Association should not be designated for cars of particular capacity. This is at once apparent when it is considered that under this assumption no consideration is given to the weight of the body of the car, which varies through wide limits. This is, of course, a portion of the weight carried, and together with the lading makes up the total weight carried on the car axles. Therefore, the committee would ask your consideration for a better designation of these axles, which would be as follows:

Axle "A," designed to carry 15,000 lbs.
Axle "B," designed to carry 22,000 lbs.
Axle "C," designed to carry 31,000 lbs.
Axle "D," designed to carry 38,000 lbs.

Ninth. In conclusion, the committee feels that it should call the attention of members of the Association to the desirability of ordering their axles according to the M. C. B. specifications. There are a number of railroad companies ordering steel axles and having specifications varying slightly from those of the Association. It would appear to be to the advantage both of the manufacturers and of the railroad companies, to have these specifications uniform, and the committee would urge serious consideration of this question.

This report is signed by E. D. Nelson, Chairman; C. A. Schroyer, and F. A. Delano.

TESTS OF M. C. B. COUPLERS.

As a result of the experience that we have had during the past year, changes of considerable importance have been found necessary in the specifications of M. C. B. couplers, and minor changes have been thought advisable in the drop testing machine and the coupler contour gage. No changes have been found necessary in either the worn coupler gage or the twist gage, except to make the latter adaptable to the new design of coupler with increased shank.

Specifications.—The specifications in their present form have not proved as commercially practicable as is considered advisable, due partially to their lack of definiteness and to their severity, and also because there are certain portions of the specifications which, in the judgment of the committee, are unnecessary. The modifications to which the committee particularly calls attention are: First, the requirements of the specifications have been made uniform for couplers, whether of cast steel or malleable iron; second, the abandonment of the separate knuckle test. An extended experience with the M. C. B. testing machine has forcibly impressed on the committee the advantages of good, well-annealed cast steel as a material from which to make the body of the coupler; so much so that in its judgment it is inadvisable to longer retain in the specifications any preferential test for any other material. The separate knuckle test, in connection with the test of couplers is an unnecessary expense, as the knuckles are already thoroughly tested in tests 1, 3 and 4. . . .

Drop Testing Machine.—On account of the change in the design of the standard shank, it was found necessary to widen out the sides which hold the shank in place, as well as to accommodate butts of larger dimensions than the standard.

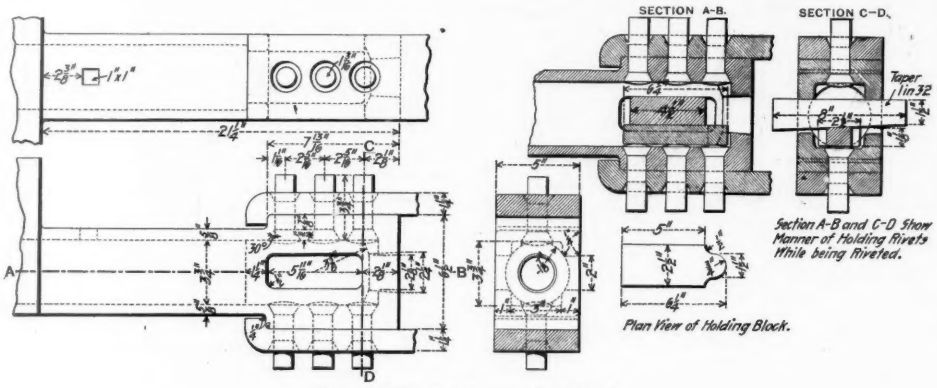
It was also found advisable to raise the sides from 17½ in. to 19½ in. on account of the severity of the test with the former height.

Coupler Labels.—Experience has demonstrated the impossibility of successfully casting in steel a legible label of the present dimensions, and while ½-in. letters might be used to replace the 5/16-in. size, a simpler arrangement, similar to that used on wheels, is preferable. The label now recommended has been incorporated as a part of M. C. B. sheet "K."

Coupler Contour Gage.—With the new design coupler contour gage it was found that through the carelessness or captiousness of an inspector, a coupler could be condemned which was really within the prescribed limits. The contour between the theoretically correct and the inferior limit allowable permits so much play between the gage and the coupler head, that the guard arm gaging screw can be made to fall beyond the end of guard arm, even though the latter may be of the proper length. This screw can then be moved to the condemning position without touching the coupler. To prevent this, and to secure approximate coincidence of center lines of coupler head and gage, a spring socket and contact has been added.

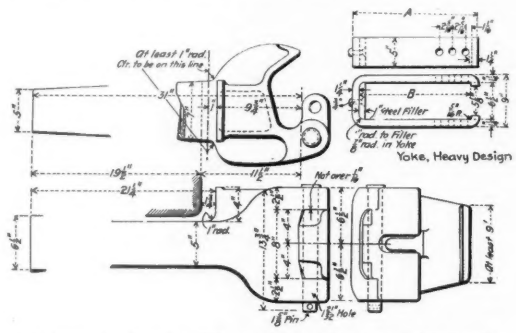
Worn Coupler Gage.—There has been some criticism of an indefinite character by some members of the Association, against the use of this gage. The committee realizing the importance of this gage, both in its use and abuse, has had the matter particularly followed up, and as a result of a year's experience, is satisfied that no change at the present time is necessary or advisable. The committee would strongly recommend that the worn coupler gage be put in general use at repair shops and repair tracks. While this will result in the condemnation of a great many knuckle pins, locks and knuckles, it will not affect a very large number of couplers. The couplers in almost all cases are brought back to gage by the replacement of the knuckle, knuckle pin or the lock, and such couplers as are condemned will be of the short-arm type or of the long guard arm, in the event of the guard arm being seriously damaged. It is the opinion of the committee that this gage should not be used at interchange points, as, for transportation reasons, it is impracticable, its use necessitating the separation of the cars. If the various roads in the Master Car Builders' Association would conscientiously put this gage in use in the manner outlined by the committee, the general condition of the couplers throughout the country would be decidedly improved, but in so gradual a manner as to work no great hardship on the car owner.

Twist Gage.—On account of the proposed changes in the shank of coupler, it has been necessary to alter the design of the twist gage so as to be applicable to 5 x 5 in. or 5 x 7-in. shanks. Also so that it can be used with butts of even larger dimensions than those of the Association.



Proposed Butt for 5 x 7 in. Shank.

Link Pin Holes and Link Locks.—The committee had hoped to have been able to present, at the present meeting, a means by which cars could be handled around curves, or on and off floats, without the use of links and pins, thus being able to abandon the link pin hole and slot in the knuckle. It has experimented with several designs of its own, as well as with some patented appliances, but as yet has not been able to find anything that successfully met all the requirements of the service. It was thought that the dimensions of the link slot might be reduced, but this has been found impracticable where floats are used, and particularly so at tide water. It is, therefore the opinion of the committee that no change should be made at the present time.



Automatic Coupler 5-in. x 7-in. Shank and Increased Head.

Proposed Heavy Coupler and Yoke.

Increased Dimensions of Coupler Body.—Since the last meeting of the Association the committee has experimented very largely with couplers with increased shank and now presents a design of shank 5 x 7 in. back of the head, with the larger dimension in horizontal plane, as its recommendation as standard of the Association. This recommendation is made after serious consideration of the changes that will be necessitated in the various parts affected, but a change must be made to get increased strength, and the proposed change gives us this increased strength with the least additional material, and less seriously affects the related parts than would the change to a 6 x 6 in. The committee, as a result of the guard arm tests of 179, 5 x 7-in. shanks and 58, 5 x 5-in. shanks, has found that the increase in strength is as the ratio of 23 to 13, or a gain of 76 per cent. Experience also shows us that an increase in the dimensions of the head of the coupler is necessary, and this fortunately the committee can give, without seriously affecting any of the working parts of the car. The dimensions 8¾ in. from the back of the lug to the inside face of the knuckle should be increased to 9¾ in., thus allowing an increase of 1 in. or more in metal through all parts of the head. The vertical dimensions of the knuckle through the knuckle pin hole have been increased to 8 in., and of the lugs to 2½ in., thus materially increasing the strength of all the parts. During the coming year the committee hopes to experiment with a head of these dimensions, and at the next meeting of the Association will be prepared to give some definite figures as to its relative strength.

Increased Butt.—At the request of the Committee on Draft Gear, we have seriously considered a redesign of the standard butt, retaining the present dimension of 6½ in. as its depth, lengthening the butt so as to allow the use of a third rivet or bolt. The dimension between the back of the butt and back of the horn has been retained as at present. The committee submits a proposed arrangement for the consideration of the Association. We have always recognized the impossibility of properly riveting the yoke to the butt because of the inability to hold the rivet. The committee, therefore, in its proposed arrangement has entirely departed from the old design, and suggests an arrangement whereby the riveting can be successfully done. As the design is quite a radical departure from anything that has heretofore been used, the committee is not prepared to recommend the arrangement as standard until after a series of experiments which are being conducted has proven the correctness of the design.

Heavy Design Yoke.—The committee has prepared a design of yoke with the strength increased to correspond with that of the increased shank, and to be used in connection with the 5 x 7 shank coupler. For the coming year the committee has considerable work laid out. As previously explained, it will be necessary to experiment with the new design of head, as well as that of the proposed butt. In addition, proper gages for the butt will have to be developed, on account of the necessity for uniformity of dimensions at all points. The abandonment of the separate knuckle test in the regular specification leaves the Association without a test for knuckles which may be purchased separately for repairs. The separate knuckle test has never been other than a rough test of the quality of the material. The committee is working on a method whereby knuckles can be tested with a dummy coupler, somewhat as are the knuckles in a complete coupler test at the present time. The committee has also felt for some time that the jerk test might be improved upon by introducing the impact arrangement as exemplified in the method at Purdue University, and recommended by Prof. Goss for the impact testing of material. If successful, this would make unnecessary the use of two couplers in the jerk tests, a dummy being substituted in the impact test for the second coupler.

This report is signed by W. W. Atterbury, Chairman; W. S. Morris, W. P. Appleyard, H. Monkhouse, and F. A. Delano.

(*Continued on page 468.*)

Power Equipment for Railroad Shops.

BY GEORGE A. DAMON.*

PART II.

(*Concluded from page 431.*)

Design of Power Plant.—In designing the central station for a railroad shop which is to be the very heart of the whole system of power distribution, it is well to consider that much can be learned from the ten years' experience gained in developing electric power stations for commercial circuits. These plants have come to be looked upon as manufactories in which the raw materials, fuel, oil and water, are turned into electrical energy ready for distribution and use. Much careful scientific thought has been expended in reducing to a minimum the amount of material and the cost of labor required to produce a given amount of electrical energy. Stations have been built which have produced a kilowatt-hour on the switchboard at a cost for fuel of 3-10ths of a cent, but a great many others have been designed which do not do as well as this. If all the items of cost are considered, which include not only the expense for fuel, oil, water, supplies and labor but also the interest on the investment and a fair allowance for the depreciation of the plant, it will be found that the fuel bill is only about 25 per cent. of the total cost of a unit of electrical energy. All the cost factors should, of course, be given their relative importance in determining the power-house design.

It must further be remembered that the plant is to be operated under railroad conditions. This means that the operation of the power plant is an incident, not a result. The business of that part of the railroad organization in charge of the shops is to repair or build rolling stock and there is little time to be given to the business of operating a central power station. In some cases the size and importance of the central power plant justifies the employment of a high-grade engineer. In other cases it is well to remember that the master

*Engineer with the Arnold Electric Power Station Co.

mechanic or shop superintendent has been operating the power part of the shop with labor of only average intelligence and corresponding pay. In such a case it is not a good idea to plan a station which has so many refinements that only the best engineer can keep it running successfully, and thus offset the saving of a few dollars' worth of fuel by an unwarranted addition to the pay-roll.

Plant for the Fond du Lac Shops of the Wisconsin Central.—The power plant shown by Fig. 3 at Fond du Lac, Wis., is a good example of what can be built when the requirements are for a plant which will require the minimum amount of expert supervision and which will run for long periods of time with few repairs and little special attention. The three boilers are of the horizontal return-tube type, each 72 in. in diameter by 18 ft. long, set in one battery. The steam pressure carried is 100 lbs. The engines are simple and are of the Corliss, heavy-duty frame type, and turn 80 times a minute. The smaller engine is belted to one 100-k. w. electric generator and the larger engine has a double crown on the flywheel for two belts to two 100-k. w. generators. The generators are direct current compound-wound dynamos running at 600 revolutions per minute, and delivering current at 250 volts. The plant is thus equipped with one large engine which is capable of handling the average load. The smaller engine is held in reserve for periods of extra heavy load and for use during periods of light loads. It is possible to raise the steam pressure to 125 lbs. in case of necessity, so that the small engine could pull a good share of the load if an accident should disable the larger engine.

It is well to remember that a railroad shop is running under factory conditions and that a large investment in duplicate equipment cannot be justified. The most economically equipped power-house will be the one which can take care of the maximum load with very little equipment to spare. When it is considered that the power plant is not working on commercial circuits, that the main part of its equipment is in operation only about ten hours each day, and that a machine shop is readily available for repairs, it will be seen that long chances on a breakdown can be taken. Both engines and generators should have an overload capacity of at least 50 per cent., and should be capable of standing these overload conditions for an hour at a time. It is well to remember in selecting the size of the engine that the average output of any generator in service will only be about three-quarters of the rated capacity of the machine, owing to the widely fluctuating demand for power. The engine should, therefore, be proportioned for best economy at this three-quarter load, even if some economy is sacrificed when the heavier loads are carried for short periods.

In the Fond du Lac plant the 12-in. main steam header is carried on brackets along the wall back of the boilers, and extends directly into the engine room. The engine connections are made through wrought-iron bands connecting to steam separators on top of the engine throttles. An auxiliary steam header is run for the

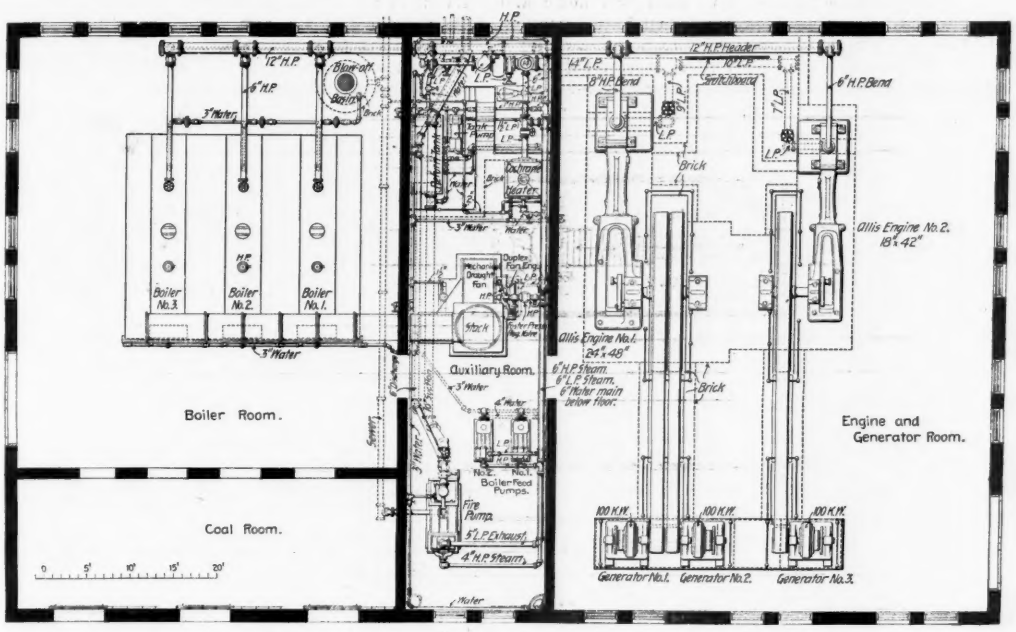


Fig. 3—General Arrangement of Machinery and Piping Systems in Power House—Wisconsin Central Shops, Fond du Lac, Wis.

pumps and other auxiliaries. The engines exhaust into a header located in a brick pipe pit beneath the floor. Between the end of this exhaust pipe and the heating system connections an oil separator is located to remove the cylinder oil from the exhaust steam before it passes to the heating coils of the blowers. These shops are heated with the fan system.

The main exhaust steam header leaving the plant is a 12-in. pipe and is carried overhead through the buildings and by means of trestle supports between them. After the steam is condensed in the heating coils it is returned to the power plant through a gravity return system graded toward the central station and located underground in wooden boxes. In the pump room of the plant is a pit containing a large return tank and a steam pump. The return water reaches this tank at about 180 deg. F. temperature and is then passed into an open heater which uses the latent heat in the exhaust steam of the auxiliaries to heat the water to about 210 deg. before it reaches the boilers.

The boiler feed pumps are in duplicate, and an injector is also provided. A water meter is arranged to measure the hot boiler feed water. The pump-room also contains a service pump which ordinarily delivers water to the hydrant system and to the stand tower, but is so connected that it could be used for a boiler feed pump or as a fire pump. The water supply comes from a drive well but an auxiliary electric pump has been installed to deliver water from a lake nearly a mile distant. In addition to this there is a cross connection to the village system arranged for mutual protection. At the present time there is no air compressor in the main power plant, though space is provided for the installation of one in the future. The air system is now supplied with electric motor driven compressors located at the points of demand, and with air pipes interconnected.

The general arrangement of the plant may be examined with interest. The space available did not allow of the most desirable arrangement. The boiler room is at one end of the power station and the engine room at the other, with abundant provision for extension either way. The pump and auxiliary room is located between, convenient to both engineer and fireman. The coal is unloaded from the cars into the coal storage room, which requires that all the coal be handled two or three times before it reaches the grates. The size of the plant, however, does not justify the expense of mechanical coal and ash conveyors. The grates are of the shaking type, and the furnaces are hand-fired. The switchboard is located between the engines and convenient to the engine throttles. This board is arranged so that any one or all three generators can be operated together on either the power circuits or the lighting circuits separately or both together. The wiring system for the lights is separated from the power feeders.

Power Plant for the Oelwein Shops of the Chicago Great Western.—Figs. 4 and 5 show the general arrangement of the central power plant of the Chicago Great Western shops at Oelwein, Iowa. These shops have been in operation since January, 1898, and were the first to embody full advantage of the central power station idea. In this power house are used water-tube boilers of 1,000 h.-p. capacity and the steam pressure carried is 125 lbs. The engines are of the high-speed automatic type, and are directly connected to the 220-volt direct current generators.

The system of connecting the engines and generators is worth noting. Each generator is mounted on a hollow shaft or quill, which is supported in independent bearings. Through these hollow shafts extend a solid shaft which is also supported in independent bearings. The engine shafts, the generator quills and this solid shaft are arranged to be connected by special 3-way bolted couplings in such a way that one engine can operate any one or all three of the generators, and the other engine can run either or both of two generators. One engine is double the power of the other when working at economical load. Both engines are of the tandem compound type, and the smaller engine has a by-pass steam connection to the low-pressure cylinder so arranged that high-pressure steam can be introduced into the larger cylinder through a reducing valve, and thus enable the engine to carry double load in case of emergency. These arrangements are introduced into the plant in order to secure reliability without an investment in reserve machinery. The large engine is designed to carry the average load. The smaller engine helps out at times of extra load, carries the light load, and also by taking advantage of the overload features, it can take the place of the larger engine in case of accident. The Oelwein power plant contains an air compressor having a capacity of 1,000 cu. ft. of free air a minute, a deep-well, electrically-driven pump and an Underwriters fire pump. These auxiliaries are located in a separate room at the end of the plant, which unfortunately cuts off the chance for extending the boiler room.

The draft is secured by means of a brick chimney at one end of the power plant building. In this installation the pipes for distributing compressed air, live steam, exhaust steam and water from the central station to the various buildings are carried in an underground tunnel. This subway is also used for the electrical feeders, the pipes being hung at the side of the tunnel and the wires are supported at the top. The system of heating in use at Oelwein is the motor-driven fan or blower system. The returns from the coils are brought back to the power plant by means of a pipe in the lowest part of the tunnel. An auxiliary air exhaust system is used to remove the back pressure from the engines.

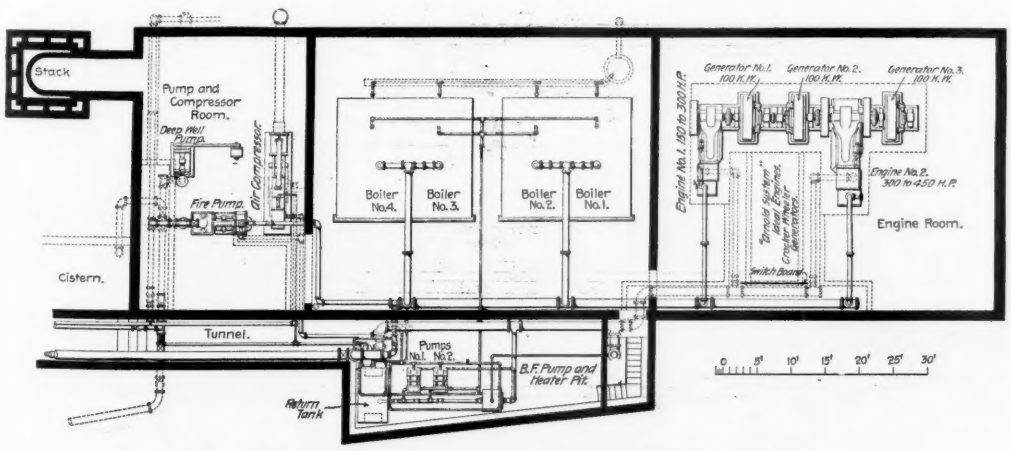


Fig. 4—Plan of Power House—Chicago Great Western Shops, Oelwein, Ia.

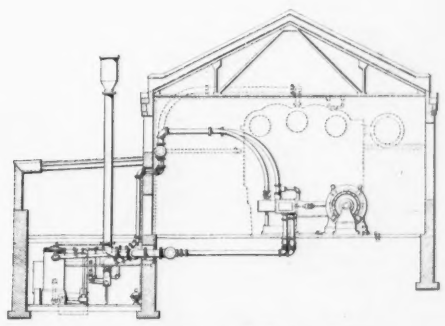


Fig. 5—Section Through Power House—C. G. W. Shops.

It will be seen that in neither the Oelwein or the Fond du Lac plants has the ideal arrangement of the station been reached. A careful study of the tendency in the design of commercial electric plants shows that the best arrangement is to divide the engine room from the boiler room by means of a fire wall. The boilers are arranged with their backs to this wall and are connected to a steam header from which all the engines

are supplied, all main connections being made through long sweep bends. This disposition of the equipment lends itself to the simplest arrangement of a minimum amount of piping. One end of the plant should be arranged for the extension of both the boiler and engine room.

There are a number of points in connection with the design of a power plant upon which there cannot be said to exist decided tendencies. The mechanical draft fan with its short stack and easy control is a candidate for the place occupied by the self-supporting steel stack or the brick chimney. The pressed-brick stack, made of hollow bricks, specially formed for stack purpose, is less expensive than the regular brick chimney and is meeting some favor. The use of economizers to save the latent heat in the flue gases and the installation of cooling towers where condensing water is not available, are refinements which may be considered. The question of condensers for the engines is complicated by the fact that in most installations there will be use for the exhaust steam for heating purposes during six months of the year. It might be possible to develop a system of heating in which the circulating water of the surface condensers could be pumped through the heating system with a considerable degree of economy, but such a system has not yet been installed.

The question of whether or not to use coal and ash handling apparatus, mechanical stokers, pump governors and many other devices for saving labor and contributing to the plant efficiency should be settled along with the other preliminary considerations. In considering each device the cost of installing it in complete working order and the saving in fuel, labor, and other advantages to be gained should be understood. And each piece of apparatus should be required to make a good showing to the inquiry, "Does it pay?" The railroad engineer who takes up the design of a railroad shop power equipment will find that the various problems which he is called upon to solve will require a fund of information in all branches of mechanical, civil and electrical engineering and in all his work will have few better opportunties of proving the familiar statement that "Engineering is the science of making a dollar earn the most money."

The Boston Elevated Railroad.*

As already noted in the *Railroad Gazette*, the elevated railroad in Boston was opened for business between Charlestown and Roxbury on June 10. A sketch of the line of the road, showing the signals, is given in the diagram printed herewith. The construction of the track, with guard rails and third rail for conducting the electric current for propelling the cars, may be understood by reference to Fig. 7.

In the diagram of the road, Fig. 1, the heavy dotted lines indicate the portion of the track which lies in the subway, and the light dotted lines are tracks used by surface street cars. The distance from Sullivan square to Townsend street, through the subway is 5.2 miles; by the Atlantic avenue line it is 5.7 miles. The gap in the diagram between Scollay square and Haymarket square is due to the fact that this line is shorter than that via Hanover street.

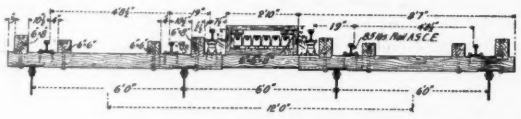


Fig. 7—Standard Track of the Boston Elevated.

The signaling, put up by the Union Switch & Signal Co. is the most complete plant of its kind ever built; and it is the first, so far as we know, in which automatic rail-circuit block signals are worked on a track which also carries the return of a power circuit, used for propelling the cars. The third rail, for the power current, being on the left-hand side, the track rail next to it carries the return, and the farther, or right-hand track rail, carries the signal current. A copper return wire is laid down to reinforce the left-hand rail as a conductor.

The line begins at Guild street, beyond Dudley street station, at the "South End," and runs in a general northerly direction through the center of the city (part of the way by two routes, as shown) to Sullivan square, in the Charlestown District, about 5 miles. The signals are electro pneumatic semaphores, standing normally "all-clear." The post and the box for the pneumatic cylinder are of iron. Green is the all-clear color in night signals, and yellow is the night "caution" color in the distant signals. The home-signal arms are painted red, and the distant yellow, and arms at interlocking cabins have a vertical white stripe. The signals are numbered as shown, a separate series being used for signals on that portion of the line which lies in the subway. The lengths of the block sections, in feet, are shown on the drawing. These lengths are varied according to the situation of the stations and curves so as to provide for a uniform time interval of one minute between trains, the assumed rate of speed being 30 miles an hour. Distant signals are used only for a few block sections where the line is favorable to high speed.

As all of the cars used are motor cars, and have automatic stopping apparatus, arranged to act if the car runs past a stop signal, each home signal has to be fixed the length of a train, about 180 ft., in the rear of the track section which works it, so that a train will not set it until all of the cars of the train have passed it. Thus a train does not clear signal A until its first car has passed 180 ft. beyond signal B.

The small signals on the plan are interlocked signals worked in connection with switches.

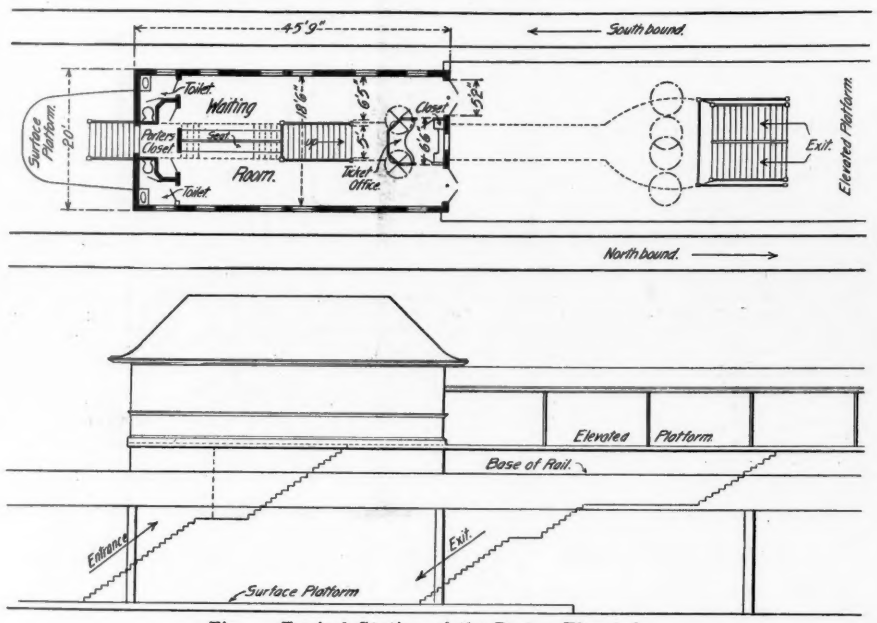


Fig. 2—Typical Station of the Boston Elevated.

NOTE.—*The turnstiles in the exit are on the landing beneath the elevated platform.*

The interlocking apparatus at the several towers shown on the diagram is electro pneumatic, except at towers B and E. The number of functions at each is as follows: A, 25 signals, two double-arm signals and 28 switches, including 24 for the tracks used exclusively by surface cars; B, three switches, seven signals and three facing point locks; C, 12 switches, 12 signals and five double-arm signals; D, six switches, three signals and two double-arm signals; E, three switches, seven signals and two facing point locks; F, five switches, seven signals and one double-arm signal; G, 10 switches, 12 signals and two double-arm signals.

There are four compressors to furnish air for the block signals and the five power interlocking machines.

The drawing, Fig. 2, shows the arrangement of the station at Northampton street, and this plan is typical

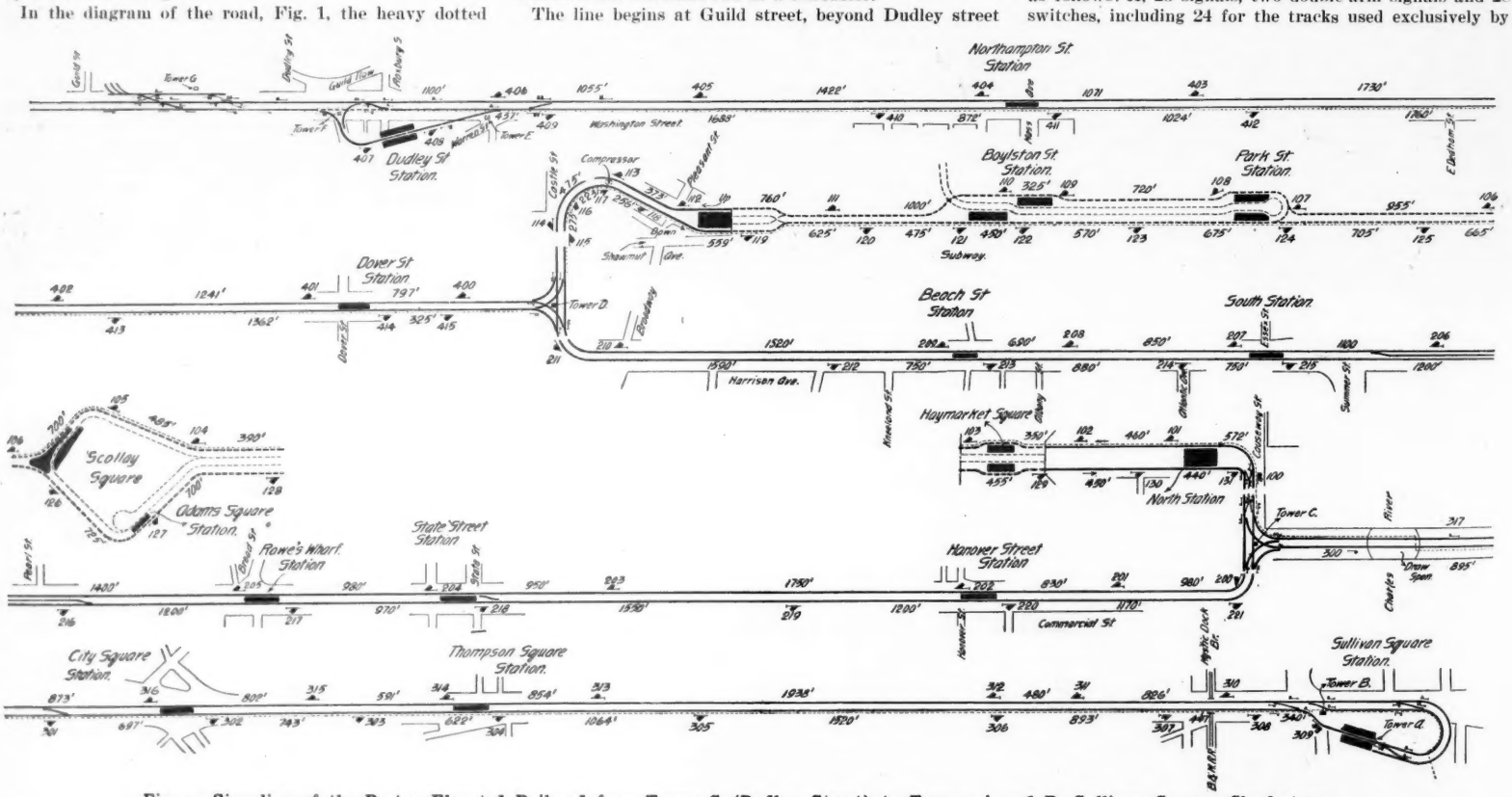


Fig. 1—Signaling of the Boston Elevated Railroad from Tower G (Dudley Street) to Towers A and B, Sullivan Square, Charlestown.

NOTE.—*The automatic signals for the block sections near the interlocking towers control indicators in the towers as follows: Signals 406, 407, tower F; 405, towers E and F; 404, tower E; 209 and 210, tower D; 129, 130, 131, 220, 221, tower C; 301, 315, 316, tower C; 306, 308, towers A and B; 309, tower A. Signal 100 is a rail circuit signal, but is directly controlled from the tower, and 309 is the same.*

*The structure of the Boston Elevated (Electric) Railroad was described in the *Railroad Gazette* July 2, 1897, and a map of the line was published on that date and again on April 22, 1898, when the typical station was described. Some of the construction work was described in the issues of July 7 and Nov. 24, 1899; also April 20, 1900. The foundations of the power house were described Sept. 7, 1900. Plans of the Sullivan Square terminal station were published May 3 of the present year, and something about the electro-pneumatic automatic block signaling was given April 19, page 289.

of those of all of the stations, except two or three. These stations are built with steel frames and stairways and are sheathed, both on the roof and the sides, with copper. The inside finish is all of quartered oak. Each station has two toilet rooms, as shown on the plan, with basins and drinking water. On the steps Mason's safety treads are used. The station at Beach street is on private property, and that at the South Terminal Station of the Albany and New Haven roads has a stairway leading directly down to the concourse in the terminal station. Practically all of the other stations are island stations.

Fig. 3 is a view of the station at City Square, Charlestown, and Fig. 4 shows the same with a train of two cars. Fig. 5 shows the interior of the Sullivan square station, looking toward Boston. The unoccupied tracks of 100 cars, most of which were made by the Wason Manufacturing Company, of Springfield, Mass., and were delivered to the company some months ago. These cars all have motors, and each has a motorman's cab, with controlling apparatus, at both ends, though ordinarily trains of four or five cars will be run in the busy hours of the day and trains of three cars or less in the lighter hours. Each car is equipped with the Sprague multiple unit system of control. In these cars all of the seats are arranged along the sides, the passengers facing across the car, and every car has a side door, on each side, in the middle. This door will be arranged so as to be opened only from the outside; and except where there are very large numbers to get on or off they will be kept closed. The cars have no steps, as the station platforms are substantially at the level of the floors.

matic, compressed air, and there is a main reservoir under each car. These reservoirs are connected together throughout a train, as are the multiple-unit controllers for controlling the power, so that in an emergency the train can be managed from either end of any car, the engineer's valve of the air-brake being also duplicated in every motorman's vestibule.

The color of these cars outside is maroon. Each car has on the roof at each end a headlight, and there is a colored light on each side of it to indicate the destination of the train. Every car has an air whistle.

In the elevation Fig. 8 the fixtures and appliances for the air-brakes and other apparatus beneath the floor are omitted, it being impossible to show these satisfactorily in a drawing of this size.

The power house, called the "Lincoln Power Station," is at Lincoln wharf, Commercial street. It is a building 155 ft. wide x 145 ft. long. The floor areas are as follows:

Basement	11,200 sq. ft.
Engine room floor	8,580 " "
Engine room galleries	5,915 " "
Boiler room floor	11,200 " "
Boiler room galleries	500 " "
Economizer room floor	3,660 " "
Economizer room galleries	2,460 " "

The total boiler horse-power is 6,000 arranged in six chimney is 251 ft. high, and has a 13-ft. flue.

The total boiler horse-power is 6,000 arranged in six batteries of two 500 h.p. boilers in each battery. The boilers are Babcock & Wilcox, water tube, with Babcock & Wilcox superheaters. The total horse-power of the engines is 12,000, divided into three units of about 4,000 nominal horse-power each. Two of these engines are Rice & Sargent, 44 in. x 88 in. x 60 in., vertical, cross compound, with Corliss valves throughout; and one is a Westinghouse vertical, cross compound, 44 in. x 87 in. x 60 in. with poppet valves on high pressure and Corliss valves on low-pressure cylinders. All the engines run at 75 revolutions per minute. The total nominal generator capacity is 8,100 k.w. each at 560 volts, divided into three units of 2,700 k.w.

The switchboard consists of one station panel, three machine panels, one spare panel and six feeder panels for elevated lines. These feeder panels have a capacity of 3,000 amperes each.

Besides operating a section of the elevated lines, provision is also made for supplying power to the surface lines. The station is equipped with Green fuel economizers and Blake air-pumps and condensers. The Hunt system of coal conveying is used to supply coal to the Roney automatic stokers.

Fig. 3.—Station at City Square, Charlestown District.

Fig. 4.—Two-car Train at City Square.

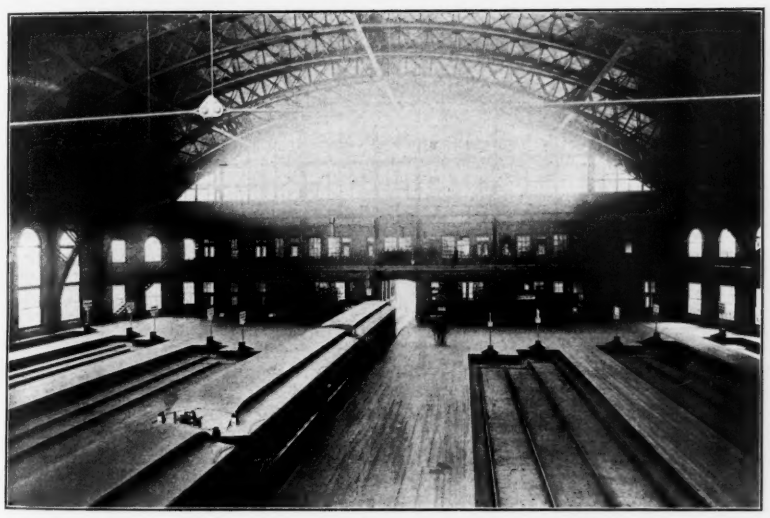


Fig. 5.—Sullivan Square Station, Looking South.

Fig. 6.—Dudley Street Terminal Station, Looking North.

Boston Elevated Railroad.

are those used by surface street cars. The upper rooms in the end of the station are the Superintendent's offices.

Fig. 6 shows the terminal at the south end of the line, looking north. The elevated track is the one passing through the center of the building. The main elevated line is seen in the distance at the extreme left; and all the other tracks shown in the view are for surface cars, which at this point are brought up to the level of the elevated railroad, permitting passengers to change cars from one line to the other across a level platform.

Fig. 8 shows the standard passenger car of the line, from a drawing prepared by Chief Engineer George A. Kimball, to whom we are indebted also for the photographic views and other material.

The line was opened for business with an equipment

The Van Dorn drawbar is used. The trucks conform to the M. C. B. standard. The motor truck has a wheel base of 6 ft. and the trail truck one of 5 ft. The former has 33-in. wheels and the latter 30-in. The wheels are wrought iron, spoke, with steel tires. The axles, of open hearth steel, are 6½ in. in diameter at the center. The journals of the motor truck are 4¼ in. x 7 in. There will be two Westinghouse "50 C" motors on the motor truck, each of 150 h.p. and weighing 2¾ tons. The center pins of the car are 33 ft. 3½ in. apart.

The cars are heated and lighted by electricity. On both sides of the motor truck there are shoes for taking current from the third rail. Each car carries an air compressor, run by an electric motor, for the air-brakes and the whistle. The brake is the Christensen, auto-

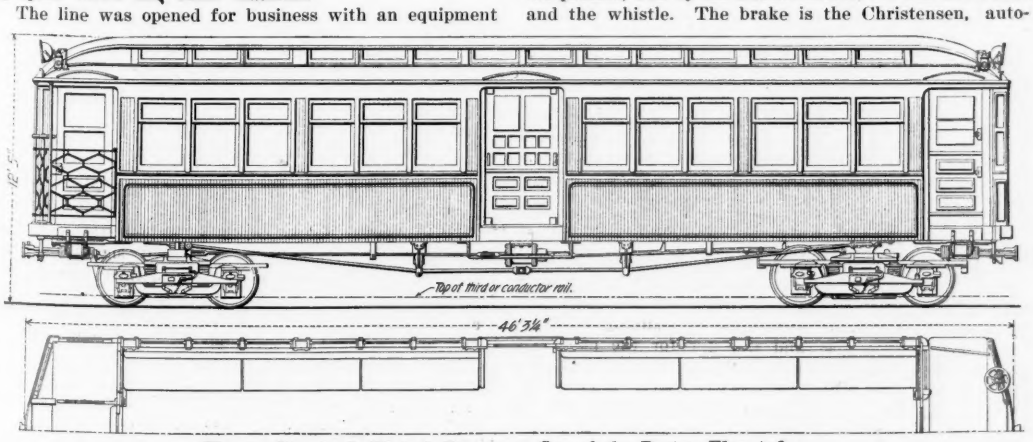


Fig. 8—Standard (Motor) Passenger Car of the Boston Elevated.

The Exhibits at Saratoga.

The display of railroad materials and supplies at the Master Mechanics' and Master Car Builders' conventions this year at Saratoga, N. Y., has probably never before been equaled for variety and the number of interesting things shown. A complete list is given below.

The exhibit of a machine to automatically charge coal into a locomotive fire-box attracted much attention, and it may be specially mentioned as a thing which has been brought out since the last meeting. This decreases the work of firing and saves fuel. With the large locomotives now generally used it seems that it will be necessary to employ two firemen; materially increase the pay of the fireman if but one man is used, or make use of some device or machine which will lighten the work of the fireman. An exhibit which got much attention from shop men was one showing the application of variable speed motors to large machine tools. For the carmen there was a variety of steel cars shown which being ranged along one track made comparisons of different designs easy. Fine exhibits of passenger car lighting were made including Pintsch gas, acetylene gas, and electricity. From the coupler exhibits, it is evident that a number of makers are working to simplify the M. C. B. coupler, and render it truly automatic. Roller side bearings also are receiving a good deal of attention, and, of course, the draft gear exhibits were closely examined. Not all of the draft gear makers had exhibits, but many interesting riggings were shown, and others came to the convention with drawings of new designs of draft gear with a view to getting an opinion from railroad men. Without doubt many new riggings will be brought out during the year. Apparently copper sheathing for passenger cars is to be put on the market in such a way that railroads generally can make use of it. More uses have been found for pneumatic tools, and the exhibits were very fine. These are only a few of the newer things which particularly impressed one in going about among the exhibits. The list is as follows:

Adams & Westlake Co., Chicago.—This was a very interesting demonstration of the Adlake acetylene gas car lighting system. In this system the water is fed to the carbide and the apparatus in its present form is the result of extensive investigation and study. The apparatus has been severely tested in service, and is now in use on a number of roads. The exhibit was installed in a frame house having the dimensions of a passenger car. The generator and lights were arranged as in cars, presenting an excellent opportunity to study the working of the apparatus. In a future number a full description of the system will be given.

American Car & Foundry Co., St. Louis, Mo.—This company showed six cars of different types embodying its latest practice. The first is a Northern Pacific box car with steel underframe and steel upper frame and wood sides, ends and roof. The load limit is 90,000 lbs., the length inside 40 ft., the width 8 ft. 6 in., and the weight empty is 59,600 lbs. This car has steel channel center sills, angles for side sills and cast steel end sills. The upper frame of the sides carries its proportion of the load. A hopper-bottom coal car of the Central Railroad of New Jersey has been in service three months. The load limit is 88,000 lbs., the light weight 33,900 lbs. and the cubic capacity level full is 1,400 cu. ft. This car is all steel, has channel center sills and the side sills beyond the hopper plates are angles connected with lacing. The end sills are cast steel. A Pittsburgh, Ft. Wayne & Chicago hopper car is similar to the last in general features, and has been in service nine months. The load limit, however, is 110,000 lbs., the cubic contents level full is 1,800 cu. ft. and the light weight is 38,500 lbs. A similar Northern Pacific hopper car has been in service three months, and has a load limit of 88,000 lbs., a light weight of 34,600 lbs. and 1,445 cu. ft. contents level full. A Chicago & Alton flat-bottom coal car with drop doors has been in service four months, and has steel channel center sills, cast steel end sills and transverse members near the middle and on either side of the doors formed of heavy I sections. These latter are jointed to the ends of the vertical stiffness, and support all the longitudinal sills. The load limit is 88,000 lbs. the light weight is 32,450 lbs. and the capacity level full is 1,270 cu. ft. A Chicago & Eastern Illinois flat-bottom gondola has drop doors, and is of 110,000 lbs. maximum capacity. It weighs light 36,500 lbs. and level full has a capacity of 1,565 cu. ft. The center sills are channels, the side sills angles and the end sills are steel castings. The sides have flanges at the top, projecting outward, to increase the capacity and the ends are raised for the same reason. The trucks of all these cars are of the channel arch bar type with cast steel truck bolsters.

American Brake Shoe Co., Chicago.—Pamphlets illustrating the various kinds of locomotive and car brake shoes made under patents controlled by the company. These include locomotive shoes as follows: Cast steel, skeleton steel insert, Diamond "S," Herron and skeleton "U" driver shoes. Also car shoes of these different types both flanged and unflanged.

American Dust Guard Co., Columbus, O.—Dust guards for journal boxes.

American Locomotive Sander Co., Philadelphia, Pa.—As is well known, this company makes the Leach, Sherburne, Houston, She, Curtis and Dean locomotive track sanders. A full size model of the first named was shown.

American Machinery Co., Grand Rapids, Mich.—Full size models of Oliver wood trimmers, styles Nos. 3 and 6, and of the Oliver Universal saw bench.

American Steel Foundry Co., St. Louis, Mo.—Models of American steel trucks and body bolsters.

American Watchman's Time Detector Co., New York.—Full size models of a watchman's time detector (electrically operated): Morse system electric time clocks; portable watchman's clock and Morse system employees' time recorder.

Armstrong Bros. Tool Co., Chicago.—Tool holders for lathe and planer work.

Atlantic Brass Co., New York.—Samples of the A. B. C. journal bearing.

Atlas Pipe Wrench Co., New York.—Full size models of the Atlas pipe wrench.

Atlas Railway Supply Co., Chicago.—Atlas primer; Atlas surfacer for passenger cars and locomotives and I. X. L. composition for iron and woodwork.

Auto Coupler & Supply Co., Cincinnati, Ohio.—The coupler shown is very ingenious, and consists of but seven parts, and is strictly automatic under all conditions of service, both when two of these couplers operate together and when the auto coupler engages an ordinary coupler of the M. C. B. type. The coupler head is pin-connected to the bar, and is free to swivel within limits; it has a simple and positive lock-set within the head, and chains, keys, bolts or brackets are not required. Cars can be coupled automatically when brought together with both knuckles in the closed position. As shown, full-size couplers were mounted on trucks so they could be run together. This exhibit attracted much attention.

Baltimore Ball Bearing Co., Baltimore, Md.—Samples of the Norwood ball side bearing for cars.

Bethlehem Steel Co., South Bethlehem, Pa.—Samples of nickel steel forgings for locomotive work; also specimen chips cut from armor plate, gun steel, etc., by tools of Taylor-White steel.

Bettendorf Axle Co., Chicago.—On a platform near the other exhibits, this company showed a complete structural steel underframe for freight cars, a pressed steel longitudinal sill of new design, Bettendorf bolsters and the metal running gear for a farm wagon. This last named was merely to show some of the intricate shapes pressed up in the works at Davenport, Ia.—The structural steel underframe consists of 12-in. I-beams for center sills and 12-in. channel end and side sills. The depth of the section of the long sills beyond the body bolsters is reduced by making a corrugation in the web or by cutting the web and pressing the channel to the desired form. This structural steel frame weighs 5,100 lbs. The novel feature of the pressed steel sill is that the depth is gradually reduced from the middle to the bolsters, beyond which it is again increased so as to furnish a suitable connection for the draft rigging. On the tracks of the Delaware & Hudson a 70,000-lb. flat car was shown fitted with the Bettendorf structural steel underframe and Bettendorf trucks. This car has been in regular service for 18 months, and has had no repairs. A test load of 92,000 lbs. between the bolsters produced a deflection of but 7-16 in. There are four 12-in. I-beam longitudinal sills and two 15-in. channel end sills in this car. The side sills are tapered to give the desired section throughout, and the center sills are similarly shaped, excepting that beyond the bolsters the webs of these sills are cut and spread to give a depth of 15 in.; at the body bolster the depth is 8 in., giving more room vertically for the body bolsters than is usually provided. The center sills are given this greater depth at the ends to favor the attachment of the draft gear. The trucks for this car have side frames made from 18-in. steel I-beams, and are said to weigh 317 lbs. less than arch bar trucks of the same capacity. A portion of the web near each end of the side frame is cut and turned in to form a connection with the transom, and in the same way near the middle the web is cut and pressed into flanges for connection with the column guides. The upper flange is bent downward so as to rest on the top of the journal box.

F. W. Bird & Son, East Walpole, Mass.—Samples of Torsion-proof roofing for freight cars.

R. Bliss Mfg. Co., Pawtucket, R. I.—Models of the Wood patent safety car gate as used on the New York, New Haven & Hartford and other roads.

J. G. Brill Co., Philadelphia.—A full size No. 27-E truck, several sets of which have been furnished the Brooklyn Elevated R. R. for its heavy cars. The frame is forged steel, and the truck design in general follows the lines of the most advanced work of the Brill Company for steam passenger car and electric elevated service.

Boston Artificial Leather Co., New York.—Car seats upholstered with Morocceline, a substitute for leather; samples of the same goods for headlinings and upholstery purposes; also car curtains and samples of Oakette.

Boston Belting Co., Boston, Mass.—Samples of air-brake, steam and water hose and other rubber goods adapted to railroad use.

Boston Woven Hose & Rubber Co., Cambridgeport, Mass.—Samples of Vim air-brake and other rubber hose.

S. F. Bowser & Co., Fort Wayne, Ind.—Model of the Bowser adjustable measure self-measuring shop oil cabinet.

Brown & Paxson, Douglas, Ga.—Model of a new car coupler.

Buckeye Malleable Iron & Coupler Co., Columbus, Ohio.—This company exhibits a new coupler, the "Major," having a lock-set within the head and a knuckle opener. The wearing surfaces have been increased, and more metal is used in the lugs than in former designs. A draft gear with long malleable iron sills is also shown. This gear is said to have a spring capacity of 80,000 lbs., the springs being 12 in number, arranged three abreast and two deep and in tandem groups. A device for coupling cars fitted with solid knuckles on sharp curves is also shown. This emergency knuckle is called the "Major."

Buffalo Forge Co., Buffalo, N. Y.—A full size model of a Buffalo down draft forge connected to a motor of the General Electric Co. to show method of working.

Butler Drawbar Attachment Co., Cleveland, Ohio.—Full size models of the single spring Butler attachments applied to wooden sills; Butler tandem spring rigging applied to steel channels and Butler tandem spring rigging applied to malleable iron draft beams.

Carborundum Co., Niagara Falls, N. Y.—The exhibit of this company showed the product of the company from the ingredients to the finished material. The initial process was represented by two models of the walls and interior of the furnace used in making Carborundum, the first showing the raw materials and core, and the second the crude Carborundum as it appears in the furnace just before its removal. The finished articles displayed included a pyramid of specimens of Carborundum wheels from the smallest (for dental purposes) to those 36 in. in diameter.

Carse Bros. Co., Chicago.—The exhibit of this company included specimen hollow chisels and bits, high-speed boring bits and expansion boring bars and a large number of framed photographs of woodworking machines made by the S. A. Woods Machine Co., of South Boston, Mass., for which concern the Carse Bros. Co. is agent.

A. M. Castle & Co., Chicago.—Sample of locomotive side sheet showing the "Cour" method of corrugating. There is also shown, by catalogue, a line of boiler makers' supplies.

Celluloid Co., New York.—Car seats and chairs upholstered with Texoderm, a substitute for leather; also samples of the same material.

Charles H. Besly & Co., Chicago.—Sample of parallel clamps, Gardner grinders and taps.

L. C. Chase & Co., Boston, Mass.—The company made its usual fine display of the well-known Chase Mohair plush, made by the Sanford mills, and a full line of samples of Chase leather for upholstering seats for smoking and suburban cars and for car curtains and decorations. The leather also is made by the Sanford mills.

Chicago Pneumatic Tool Co., Chicago.—This company had a large and excellent exhibit. Tools were at work, and also dismantled to show the construction and finish of the parts. This year Duntley drills and the new electric headlights and motors were shown for the first time. The following list gives an idea of the variety of tools exhibited: Chicago reversible drills in five different sizes: Boyer drills, two sizes; Chicago rotary drills, four sizes; flue cutters, flue welders, Chicago piston breast drills, Chicago rotary breast drills, Boyer long stroke riveting hammer, Boyer chipping and calking hammer, Chicago painting machine, Chicago oil rivet forges, Boyer yoke riveters, Chicago staybolt chuck, Ford dolly bars, pneumatic holder-on, Duntley drills, electric headlights and motors.

John R. Clancy, Syracuse, N. Y.—Samples of the Clancy wrought steel hose clamp.

Cleveland City Forge & Iron Co., Cleveland, Ohio.—Samples of drawbar pockets and turnbuckles.

Cleveland Pneumatic Tool Co., Cleveland, Ohio.—Full size models of the Cleveland pneumatic hammers for chipping, calking and flue beading; also pneumatic riveters.

Cliff & Guibert, New York.—Full size model of an automatic fire hose, attached to a hydrant in front of the Grand Union Hotel, where the method of working was shown. A mutoscope also was used to illustrate the working of the apparatus.

W. H. Coe Mfg. Co., Providence, R. I.—Samples of the Coe wheels for gilding with ribbon gold or silver leaf.

Columbus Pneumatic Tool Co., Columbus, Ohio.—Full size models of the U. & W. piston air drills and Columbus flue cutters operated by compressed air.

Compensating Valve Co., New York.—Full size models of the Chambers compensating throttle valves for locomotives.

Consolidated Car Heating Co., Albany, N. Y.—A car equipment of hot water heating was shown on a raised platform. The piping is fitted with thermometers to indicate the temperatures of the circulating water. A complete five-car train equipment is represented by short sections of pipe fitted with end valves, traps, etc. The exhibit includes a full line of electric heaters, in which the regulation of heat is illustrated by lamps, and the effects made visible, and electric switches.

Consolidated Railway Electric Lighting & Equipment Co., New York.—The apparatus used in this company's system of lighting with electricity, generated by a dynamo on the car axle, was mounted so as to show the operation of the machinery and the controlling mechanism. As arranged for exhibition purposes the shaft corresponding to the car axle was driven by a motor so that the speed could be varied. In addition to this, a buffet car of the Atchison, Topeka & Santa Fe, fitted with fans and electric lights, was shown on the tracks of the Delaware & Hudson R. R., and afforded a good opportunity to see the application of this system to a car. A number of railroad men saw the working of this apparatus on the way from Chicago to Saratoga, and again when the Master Mechanics' Association went to and from Schenectady at the time of the excursion to the Schenectady Locomotive Works. While the M. C. B. Association was in session a car fitted with a new system of refrigeration was shown. In this system the power required to work the refrigerating machinery is taken from the car axle.

W. W. Converse & Co., Palmer, Mass.—Samples of paste for cleaning headlights, etc.

The Crane Co., Chicago, Ill.—The exhibit of this company included full size models of the new Crane muffler pop safety valves for locomotives made to be self-adjusting by means of an auxiliary spring and plate which regulates the waste with the smallest lift. Also globe, angle and blow-off valves.

S. A. Crone, New York.—Samples of fibre dust and oil guards and models of a rocker side bearing and the Miller car ventilator and grain door.

Crosby Steam Gage & Valve Co., Boston, Mass.—A full line of Crosby muffled and plain pop valves, chime whistles and waterback locomotive gages; Johnstone blow-off valves and Crosby spring-seat globe and angle valves.

Curran & Burton, Boston, Mass.—This firm are agents for the Huff track-sander, the Huff variable exhaust and the Huff automatic steam blower. These devices were shown in operation, and attracted considerable attention. The two first-mentioned were described in our last issue.

Curtain Supply Co., Chicago.—A complete line of samples of car curtains and curtain materials and fixtures handled by the company.

E. M. Dart Mfg. Co., Providence, R. I.—The exhibit of this company formed part of the splendid display of the Fairbanks Co., of New York (agents for the E. M. Dart Mfg. Co.), and included a full line of samples of the Dart patent union coupling and Dart flange union.

Day-Kincaid Stoker Co., Cincinnati, Ohio.—This device for charging coal into locomotive fire-boxes was fully described in a recent issue. The stoker is fed from a hopper, which is filled by the fireman, and the coal is carried forward by a screw and placed in small quantities ahead of the operating piston. The movement of this piston throws the coal forward and it is scattered by striking a deflecting plate. The machine, through a cam motion, throws coal to the far end of the fire-box on one stroke, to the middle of the fire-box in the next and then just below the door. In this way the entire grate is supplied automatically with small quantities of coal without opening the fire-door. The machine is operated by steam, and can be regulated by the fireman to suit the conditions. One of the stokers was shown in working order, and received much attention. Good results are said to have been obtained in service on the Chesapeake & Ohio and other roads are making trials.

Dayton Malleable Iron Co., Dayton, Ohio.—Seven full size applications of the Dayton draft rigging were shown. These included the single and twin spring rigging applied to wooden sills and twin rigging applied to steel channels, pressed steel sills and to various styles of malleable iron draft beams. In addition to the draft rigging, there was shown the Dayton patent car door fastener, lubricated center plate, brake levers and brake wheels.

Detroit Lubricator Co., Detroit, Mich.—New style 3-C lubricator, 1900 pattern, having the new automatic chest plug and the by-pass valve auxiliary oiler. This lubricator has check valves over all glasses, including gage glass, to prevent injury of engine crew by accident to glasses.

R. E. Dietz Co., New York.—A number of full size models of Dietz lamps, lanterns and signal lamps for railroad use.

Dressel Railway Lamp Works, New York.—A full size model of the New York Central standard headlight for locomotives, made by the company, together with the Dressel lamp for headlights. The company also showed full size models of the well-known Herculean steel signal lamp.

Economy Car Heating Co., Portland, Me.—A full size model, showing the Economy system of heating cars by exhaust steam from the air-brake pump.

Economy Railway Equipment Co., New York.—Full size models of the Economy flush freight car door and Economy exhaust nozzle. The former was described in our last issue.

The O. M. Edwards Co., Syracuse, N. Y.—This company had two splendid exhibits, one at the Grand Union and the other at the United States Hotel. They consisted of models of the Edwards window fixtures and vestibuled trap doors as used on a large number of roads. The models were exceptionally well made and attracted considerable attention.

Fairbanks Co., New York.—Registering beam for track scales, hopper scales and wagon scales; cement-testing machine; general assortment of globe, gate, angle and blow-off valves; Oster patent stocks and dies; Merrell pipe-cutting and threading machines; Nicholson compression shaft coupling and adjustable mandrels; Dart patent union couplings, flanges and stop-cocks for steam, water and gas; and Dart glue-heater; steam traps; grinders; Fairbanks' patent copying presses, and Fairbanks' Vulcabeston packing. This collection of supplies made a very pleasing exhibit. A novel idea that attracted considerable attention was the name of the Fairbanks Co., worked out in small valve disks above the booth entrance. The company's trade-mark was also similarly worked out in small valves and fittings. The registering scale beam was generally commented on as one of the best aids to permanent scale record work that has been produced.

Fairbanks, Morse & Co., Chicago.—Full size models of a gasoline hoisting engine and Barrett car jacks and blueprints of coaling and water stations built by the company. On the tracks of the Delaware & Hudson R. R. was shown a No. 1 and a No. 5 gasoline motor car and a Fairbanks gasoline motor for turn-tables was shown in operation at the roundhouse of the same road.

Felt & Tarrant Mfg. Co., Chicago.—Full size models of the "Comptometer," a machine for adding and calculating.

Franklin Mfg. Co., Franklin, Pa.—Considerable of the pipe used in furnishing steam to exhibits was covered with Mouarch pipe covering. The company also showed samples of its train pipe covering and asbestos product.

Garry Iron & Steel Co., Cleveland, Ohio.—Full size model of the Garry revolving pneumatic crane in operation.

General Electric Co., Schenectady, N. Y.—This was an elaborate exhibit showing a 7 h.p. variable speed motor operating a 6-ft. Betts boring and turning mill. A controlling board with an ammeter, two resistance boxes and a switch is used in connection with this apparatus. The ammeter indicates the exact amount of power being used by the machine at any time. One resistance box is used for starting the motor, and by means of the other variation in speed can be obtained.

Gold Car Heating Co., New York.—The exhibit of this company represented a complete car and locomotive equipment. The piping was arranged full size, the same as when applied to a regular 50 ft. coach. One side is shown fitted with Gold's duplex, double coil, sealed jet system of hot water circulation, and the other with Gold's plain pipe or direct steam system. All of the Gold specialties for car heating purposes were also exhibited, and considerable interest was shown in the Gold electric heater.

Goodwin Car Co., New York.—Model, photographs and blue-prints of the Goodwin dump car.

Gould Coupler Co., New York.—Gould Improved M. C. B. freight coupler for heavy equipment; spring buffer blocks and malleable iron draft beams for twin springs; Gould brake slack adjuster for passenger and freight service; and Gould improved M. C. B. malleable iron journal boxes.

Greenlee Bros., Chicago.—Samples of machine bits and hollow chisels and photographs of woodworking machinery.

H. G. Hammett, Troy, N. Y.—Allen-Richardson and Richardson balanced slide valves, "Sansom" bell ringer, oil cups and link grinders.

Handy Car Equipment Co., Chicago.—This company exhibited full size Snow locomotive and car replacers. Also, on the Delaware & Hudson tracks a Handy box car was shown. This car was recently illustrated and described.

and is of wooden construction. Some of the special features are windows in the sides so that the car can be loaded at coal tipples as easily as gondola cars. The sides are battered outward so as to give greater cubic capacity. The upper framing is metal, and the sides, as high as the load line for coal, consist of horizontal planking set in panels. Above these planks is ordinary siding of short lengths. In this way cheaper lumber can be used. The car exhibited was built by the Illinois Car & Equipment Co., and weighs 34,800 lbs. The capacity is 80,000 lbs., and the inside dimensions are: Length, 35 ft. 3 in.; width, 8 ft. 9 in., and height 7 ft. 1 in.

Harrison Dust Guard Co., Toledo, Ohio.—Harrison dust guards in four sizes suitable for 40,000, 60,000, 80,000 and 100,000 lbs. capacity cars. Also the Tunks uncoupling lever.

Homestead Valve Mfg. Co., Pittsburgh, Pa.—Samples of the Homestead blow-off valve for locomotives.

C. B. Hutchins' Sons, Detroit, Mich.—Models of sections of freight car roofs showing the Hutchins Nos. 1 and 2 outside and inside iron roof.

Howe Mfg. Co., Scranton, Pa.—Sand drier shown by model.

Illinois Malleable Iron Co., Chicago.—Adjustable metal smoke jacks for round houses.

James W. Jackson, New York, N. Y.—Nixon safety staybolt sleeve for locomotive fire-boxes.

Sinclair J. Johnson, New York, N. Y.—Full size model of the Johnson flush car door, and the Johnson door frame and doorway iron.

H. W. Johns Mfg. Co., New York.—Samples of asbestos goods, including fire-felt covering for steam pipes, sheet fire-felt, locomotive lagging, wick packing; Kearsarge asbesto-metallic packings and gaskets, and vulcabeston molded and pressed rope gaskets and molded rings and union washers.

Philip S. Justice & Co., Philadelphia, Pa.—Reliance hydraulic journals, ground lift and broad base jacks.

Keasbey & Mattison Co., Ambler, Pa.—Magnesia boiler lagging and train pipe covering and asbestos packing, wicking, threads and cloth.

Keratol Co., Newark, N. J.—Car shades, embossed car goods in imitation silk or leather and a car seat covered with "Keratol."

Keystone Drop Forge Works, Philadelphia, Pa.—Keystone safety shackle-hooks, Keystone connecting links, boiler stays and special drop forgings.

August Klein, Utica, N. Y.—Car and locomotive replacers for steam and street railroads.

Knitted Mattress Co., Canton Junction, Mass.—Applications of knitted elastic padding. Car seats, cab and caboose cushions with knitted elastic padding, knitted mattress for sleeping cars and knitted table padding for dining cars.

Laidlaw-Dunn-Gordon Co., Cincinnati, Ohio.—Models and photographs of air compressors.

Leschen & Sons, St. Louis, Mo.—Samples of wire rope.

Locomotive Appliance Co., Chicago.—Model of the Alfree valve gear; also the Alfree cut-off adjuster and Plano convex valves.

Lappin Brake Shoe Co., Bloomfield, N. J.—Samples of Lappin brake shoes for cars and locomotives.

Link-Belt Machinery Co., Chicago.—Large album of photographs showing some important installations of coaling stations, etc., made by the company.

Lunkenheimer Co., Cincinnati, Ohio.—Globe valves, boiler swing checks, injectors, rod cups and locomotive fittings.

Mason Regulator Co., Boston, Mass.—Mason locomotive reducing valves and steam specialties.

McCord & Co., Chicago and New York.—This exhibit included full sized McCord journal boxes for different size cars, a large model of the Johnson hopper door and samples of McKim gaskets, seamless copper ferrules and Torrey anti-friction metal. The McCord spring dampeners were shown in a form to illustrate clearly the difference between this dampener and the ordinary coil spring; also the similarity between the dampened springs and elliptic springs was demonstrated. This device is being used extensively on stock cars.

Thomas L. McKeen, Easton, Pa.—Full size model of No. 2 tandem drawbar attachment and freight car buffer.

Manning, Maxwell & Moore, New York.—The exhibit of this company was composed of articles made by the Hayden & Derby Mfg. Co., Ashcroft Mfg. Co., and Hancock Inspirator Co., and included several patterns of Metropolitan injectors, a water heater, hose strainers, check valves, muffler and open pop valves, Hancock inspirators, single screw boiler checks, duplex boiler checks with inside stop valve, Ashcroft steam gages, Hancock main steam valves and boiler washers.

Massachusetts Mohair Plush Co., Boston, Mass.—Samples of car plushes.

Metal Dust Guard Co., Baltimore, Md.—Dust guards of metal, flax and hair.

Metal-plated Car & Lumber Co., New York, N. Y.—Full size section of passenger coach plated with sheet copper.

Michigan Lubricator Co., Detroit, Mich.—Full size models of the Michigan improved triple lubricator, No. 3; automatic steam chest plug; and automatic driver brake retainer for locomotives.

Monarch Brake-Beam Co., Ltd., Detroit, Mich.—Solid brake-beams with new interlocking fulcrum. Also Monarch truss brake-beams.

Moran Flexible Steam Joint Co., Louisville, Ky.—Samples of large joints and all metal steam heat couplings.

Morton Iron Works, Brooklyn, N. Y.—Full size locomotive boiler shell and locomotive dome, both welded.

National Car Coupler Co., Chicago.—The company showed the Hinson drawbar attachment, full size. This attachment makes use of spring followers instead of the ordinary follower plates. There were also shown models of the National freight car coupler, the National steel car platform, National platform buffer, National carrier yoke and the National passenger coupler with the Miller combination.

National Lock Washer Co., Newark, N. J.—Models of car windows fitted with the new improved National sash lock.

National Malleable Castings Co., Cleveland, Ohio.—Full size samples of Tower couplers.

National Railway Specialty Co., Chicago.—Samples of the National adjustable journal bearing and the "N. R. S." hose clamp.

New York and Franklin Air Compressor Companies, New York and Franklin, Pa.—The exhibit of these companies formed part of the display of the Chicago Pneumatic Tool Co., and consisted of a compressor with a capacity of 204 cu. ft. of free air a minute, which furnished air for working the various devices of the Chicago Pneumatic Tool Co.

The New York Car Wheel Works, Buffalo, N. Y.—Two 33 in. Special, 725-lb. wheels, for 100,000 lbs. capacity cars, one of the wheels being the test wheel of a number furnished to the Pennsylvania Railroad having stood 806 blows of the M. C. B. drop test. No crack had developed in the plates, but the hub plainly showed the severe treatment to which the wheel had been subjected. The other wheel showed the mechanical treatment this company recommends for this grade of wheel, it being first bored true to center and then ground on the tread, reducing to a minimum the chance of skidding.

A. O. Norton, Boston, Mass.—Samples of ball bearing journal jacks, lifting jacks, track jacks and bridge jacks.

Norton Grinding Co., Worcester, Mass.—Samples of a piston rod and crank pin ground from a roughing cut in a lathe. The machine for doing this class of work was fully described and illustrated in our issue of June 14.

Pantasote Co., New York.—Section of a parlor car showing Pantasote curtains and seats upholstered with Pantasote. The seats and backs of the chairs were done in an embossed design, which made a rich and attractive appearance.

Pearson Jack Co., Boston, Mass.—King bolt clamp, Pearson car replacing jacks, ratchet pulling jacks, ratchet journal jack, U. S. car pusher and Goodwin brake-beam clamps.

H. M. Perry, Chicago.—New roller side bearing.

Powers Regulator Co., Chicago.—Apparatus for automatically regulating the temperature of railroad passenger cars.

Protectus Co., Philadelphia, Pa.—Samples of wood and iron painted with Protectus paint. Also samples of the S. & M. wood cleanser and the S. & M. stain. Protectus has recently been specified for a large number of new cars including the 400 steel cars ordered by the Chesapeake & Ohio, and the 1,000 by the Philadelphia & Reading.

Railway Appliances Co., Chicago.—This exhibit included the Sargent coupling for use in pulling cars, fitted with solid knuckles, off sharp curves; the Gilman-Brown emergency knuckle; the "Diamond D" steel knuckle; the O'Brien emergency knuckle; the "Economic" metallic packing; the "Best" car replacers and the "Parish" shim for use in the pin holes of worn couplers.

Railway Fuel Economy Co., New York.—Full size Bates fire door, illustrated in last week's issue.

Railroad Supply Co., Chicago.—Full size models of the Hien coupler and Hien friction gear; flexible pipe couplings and pressed steel journal box lids, and a sample generator and equipment for the Avery system for lighting cars with acetylene.

Rand Drill Co., New York.—The exhibit of this company consisted of two compressors, "Imperial" types Nos. 10 and 11, which furnished air to a number of exhibits located in the immediate vicinity. Both machines are self-contained, and No. 10 is fitted with an intercooler and water jacket.

Rochester Sash Lock Co., Rochester, N. Y.—Samples of car windows with Rochester automatic sash locks.

M. M. Rogers & Co., Chicago.—Samples of the Rogers dust guard, Rogers indestructible journal packing and receptacles for holding the packing.

The Roller Bearing & Equipment Co., Keene, N. H.—Samples of roller bearings.

H. Sabine, Cambridge, Mass.—The "Gravity" pin for automatically opening M. C. B. couplers.

Safety Appliance Co., New York.—Model of a new safety device for use in connection with M. C. B. couplers, the invention of Stephen D. Barnett.

X. C. Scott, Cleveland, O.—Models of the Piper friction draft gear.

Safety Car Heating & Lighting Co., New York.—The exhibit of this company was located in the corridor of the Grand Union Hotel, and was very attractive. It included the recent advances made in Pintsch equipment, illustrating new designs of gas and combination gas and electric center lamps and bracket lamps for all classes of cars. Also special fixtures for dining cars. The company had samples of its steam heating appliances, and a model of its complete water circulating system. As an object of interest, the company showed storm proof sea lantern, such as is used on floating buoys and stationary beacons, which automatically gives light at regular intervals.

Sargent Co., Chicago.—"Tropenas" steel castings of various kinds, including wrenches, oil cups, coal picks, machinists' hammers, sledge hammers and knuckles for all makes of couplers. Also brake shoe made under patent of the American Brake Shoe Co.

Seamless Steel Tubes Co., Detroit, Mich.—Samples of seamless steel boiler tubes.

Shelby Steel Tube Co., Cleveland, Ohio.—Samples of cold drawn seamless steel boiler tubes.

Snickle, Harrison & Howard Iron Co., St. Louis, Mo.—Models of some of the products of the company, including the Ajax truck, Leeds pilot coupler, S., H. & H. standard truck and body bolster and Davis patented counterbalanced driving wheels center. The large plant of the company was shown by a framed photograph.

Simplex Railway Appliances Co., Chicago.—Full size models of Simplex body and truck bolsters for 60,000 lbs. capacity cars and bolsters for 80,000 lbs. capacity cars. Susemihl frictionless side bearings were shown separately, and as applied to bolsters. A Simplex body bolster which received much attention is so designed that the draft timbers may be run continuously through the bolster.

W. M. Simpson, Chicago.—Full size Ferguson hydro-carbon compound heating furnace and the Ferguson heater and kindler. This was described in our issue of June 14.

Smillie Coupler & Mfg. Co., Newark, N. J.—Malleable iron and cast steel Smillie couplers of improved design.

Spiral Nut Lock Co., New York.—Samples of spiral nut locks.

T. H. Symington & Co., Baltimore, Md.—Sample journal boxes and dust guards.

Standard Acetylene Lighting Co., Springfield, Mass.—The private car "Roland," owned by the company, and in which is installed the apparatus used in the Standard system of acetylene lighting, was shown on the tracks of the Delaware & Hudson R. R. a short distance from the Grand Union Hotel. A full description of this system was published last week. As said there, the generator is of the type in which the carbide is fed to the water, the amount of carbide supplied being controlled automatically by the pressure in the gas chamber.

Standard Automatic Lubricator Co., Philadelphia, Pa.—Full size model of the Standard automatic lubricator for journal boxes.

Standard Car Truck Co., Chicago.—Models of Barber trucks for freight passenger and electric cars. The model of the truck for passenger cars was exceptionally well made, and showed clearly the important features.

Standard Coupler Co., New York.—The Standard steel platform, full size, was shown, as well as Standard couplers. The new feature of this exhibit was the Sessions friction draft gear, and there were shown full-size riggings of both the A and B type. The type A gear has been illustrated fully, and is the one in which the springs are placed at right angles to the line of draft. In the type B rigging the usual followers are replaced by steel castings, in which are the friction wedges with surfaces at 60 degrees. The springs are between these castings and in the line of draft. Malleable iron wedges from Sessions draft gear, in service four months, were shown, and the wear in that time was apparently inappreciable.

Standard Paint Co., New York.—The exhibit of this company deserves special comment. It consisted of a large booth with an oak counter, on which was a model of a refrigerator car fitted with Ruberoid roofing and P. & B. waterproof paper. Samples of other P. & B. products also were shown.

Standard Pneumatic Tool Co., Chicago.—This company showed a large number of tools, samples of which were worked by air to show their action. The following is a list of the tools exhibited: "Little Giant" pneumatic long stroke riveting hammer; pneumatic chipping, calking, beading hammer, piston air drills, reversible flue rolling, reaming and tapping machines, reversible boring machines, hand yoke riveter; staybolt nipper; pneumatic blow-off cock; pneumatic bell ringers; air hoists; steam pipe grinders; right angle attachment; pneumatic holder-on; pneumatic wood chiseling tool.

Star Brass Mfg. Co., Boston, Mass.—Full line of locomotive trimmings, including open pop and muffled safety valves, automatic water gages, chime whistles and non-corrosive gages.

Star Headlight Co., Rochester, N. Y.—Samples of headlights and lanterns.

Stephenson Mfg. Co., Albany, N. Y.—Samples of the National lubricator, Stephenson bar belt dressing and Rollins' automatic flue cleaner.

Sterlingworth Railway Supply Co., Easton, Pa.—A Sterlingworth steel car was exhibited on the tracks of the Delaware & Hudson, equipped with Sterlingworth trucks and Sterlingworth brake beams. This is a hopper-bottom coal car of the New York, Ontario & Western of 85,000 lbs. capacity. The longitudinal sills are I-beams, the end sills steel castings, and the sides are formed of steel channels placed with the flanges outside and riveted together.

St. Louis Car Co., St. Louis, Mo.—This exhibit included whole "Spiral" journal bearings, and also samples of the skeleton about which the bearing is cast. This bearing is novel, and attracted much attention.

The Webb C. Ball Co., Cleveland, Ohio.—Specimen of watches especially adapted to railroad service.

Thornburgh Coupler Attachment Co., Detroit, Mich.—Blueprints showing coupler attachments for all classes of equipment with single, double or triple springs and with or without metal draft arms.

Universal Car Bearing Co., Chicago.—Samples of adjustable car bearings.

Universal Railway Supply Co., Chicago.—Models of freight car doors.

Vose & Cliff Mfg. Co., New York.—Samples of anti-friction and yielding side bearings.

Walsh Brake Shoe Co., Chicago.—Samples of Walsh brake shoes for cars and locomotives.

Walworth Mfg. Co., Boston, Mass.—Full line of the following specialties made by the company: ratchets, Stilson wrenches, stocks and dies, pipe taps, pipe vises, pipe cutters, nipple holders, Smith's railway track ratchet and steam whistles.

West Disinfecting Co., New York.—West disinfecting appliances, disinfecting fluids, automatic disinfector and spray air pump for cleaning car floors.

Western Railway Equipment Co., St. Louis, Mo.—Models of the following devices: Combination lug and follower casing; Economy slack adjuster, tandem combination lug and follower; sill and carline pocket; bell ringer; Western flush door; interchangeable door; safety and security truck and casting; the Mudd sander; the Lindstrom non-freezing suction pipe; St. Louis flush door; Acme pipe clamps; Downing card holder; Acme tender pocket; lugless draft beam and side bearings.

Woven Steel Hose & Cable Co., Trenton, N. J.—Samples of hose covered with woven steel.

Western Tube Co., Kewanee, Ill.—Samples of Kewanee union couplings.

Williams Safety Car Window Co., St. Johnsville, N. Y.—Models of car windows showing the inside mechanism. Also to working models of car windows.

Woven Steel Hose & Cable Co., Trenton, N. J.—Samples of hose wrapped with wire.

The Telegraph Wire on Railroads—Reducing the Length and Number of Messages.

With the increase in the amount of railroad business an economical use of the wire becomes important, as although the carrying capacity of each wire may be increased in proportion to the increase of business the capacity to send and to receive (even with the aid of typewriter machines) can extend no further than the individual speed of the operator and the number of operators is an important item in the cost. It may not be amiss to present some notes for discussion on the general work and on the possibilities of reducing it, bearing in mind that it is at once the quick, the reliable and the recording medium of communication, and method of correspondence in railroad work. We can divide it somewhat as follows:

General Office Business.

a. President's, Secretary's and Treasurer's Messages.—Beyond careful wording and the use of convenient telephones these messages are not readily controlled or abbreviated.

b. Auditor, Passenger and Freight Department's Messages.—All routine work can be shortened by carefully prepared cipher codes, but the ciphers should be decidedly shorter than the originals, which is not the case with all code ciphers.

c. Transportation Department, including all work under the General Manager.—This sub-division includes the great majority of messages handled in a general office. They consist of reports of trains, reports of movements of important cars, of accidents, of cars on hand and many matters of detail. All such reports should be on regular tabulated forms, with the items numbered in one direction and lettered in the other, and the proper number and letter only are sent by wire to locate the information. The arranging for special movements, both passenger and freight, about which superintendents are to be advised in order to distribute necessary instructions, and the hurrying of special cars, and similar work cannot easily be done with the aid of tabulated forms. Of course, it is possible to arrange a service with printed instructions which will codify the general movement of important commodities of freight and of certain destinations of passengers, and these general movements can be made available by short messages for special cars.

Probably a great aid in shortening messages where no general instructions are available is by the use of file numbers designating each subject, and this method is becoming very general in telegraphing, but it is not always used with the object of relieving the wire, but principally to help in locating quickly the subject in the office. In order to get the greatest benefit from the use of file numbers it is only necessary to make the first message as full as possible and by keeping all messages (inbound and outbound) in each file together. After the first message the file number is all that is necessary to locate and give full information about the original subject. It seems to be the general impression, in order to make messages clear and sure, that the original subject must be repeated over and over again, and if an order is issued or request made for instance to look after a Government shipment for Manila all the messages back and forth will repeat not only the file number but the general subject again and again, whereas generally "File 5,000" or "My 5,000" would be just as clear and quite as definite.

Road Office Business.

a. Superintendents, including Motive Power and Maintenance of Way Messages.—Train orders and messages are generally made in good form and can only be affected by automatic signaling or similar methods, but reports and special messages can be regulated by the use of printed tabulated forms of cipher codes and of file numbers as noted above if yardmasters, foremen and others are drilled in the use of them.

b. Yardmaster's and Station Agent's Offices.—There is an enormous amount of detail telegraphing, especially in yardmasters' offices and a thorough drilling should be insisted upon in the use of forms, ciphers and file numbers, the first and last being especially valuable in aiding not only in the economy of the wire but in systematizing the work. There is always a tendency to increase the telegraph work and examinations once or twice a year would be of much service.

A number of messages, and especially reports, now sent by wire could be sent by train if a special service for getting them to the train at point of origin and delivering them at destination is instituted. These arrangements are in very general use and the principal difficulty in applying them to other business than reports is that when a subject is started by a mail message it is likely to be continued in the same way instead of by wire, and it is this uncertainty which prevents a larger use of "mail messages." If, however, they are properly worded and explained in full their use might be considerably extended.

RAILROAD GAZETTE

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EDITORIAL ANNOUNCEMENTS.

CONTRIBUTIONS—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussion of subjects pertaining to ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

ADVERTISEMENTS—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and these only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.*

Last week the interesting announcement was made that the Pennsylvania Railroad Company had secured a controlling interest in the Pennsylvania Steel Company, which carries with it of course the control of the Maryland Steel Company. This week the statement appears that the Pennsylvania Railroad Company has got control of the Cambria Steel Company. Aside from these acquisitions the Pennsylvania has also secured extensive and most valuable ore properties in Pennsylvania, and the smaller furnace men are much perplexed as to what they are going to do to get ore for their own furnaces. We take it that all this makes for peace. It is exactly like having a big navy. We judge that the commercial relations between the Pennsylvania Railroad Company and the iron and steel industries along its lines will not be very different from what they have been in times past, probably even closer if that were possible. On both sides there will be a thorough appreciation of the value of peace and harmony and of the serious possibilities of hostility.

One more step in establishing real "community of interest" among the Trunk Lines appears in the announcement that Mr. E. B. Thomas, chairman of the board of directors of the Erie, is to be elected to the same office in the Lehigh Valley. Mr. Thomas is already a director of the Lehigh Valley, and a member of the Executive Committee. The news about the chairmanship comes in a press despatch from Philadelphia, and appears to have got out about a month before the formal action will take place, but we have good authority for receiving it as correct. The Philadelphia despatch says that stock of the Lehigh Valley is now owned by the Philadelphia & Reading; the Erie; the Delaware, Lackawanna & Western; the Central of New Jersey, and the Delaware & Hudson. The other "community of interest" news of the past week is that Mr. J. C. Stubbs, the veteran traffic man of the Southern Pacific, is to be put in supreme control of all the traffic of the Union and the Southern Pacific, together with that of the Oregon Short Line and the Oregon Railway & Navigation, these four being the roads west of the Missouri River now controlled by the Harriman interest. This is important, but probably not of such extreme and far-reaching importance as the reporters seem to believe. They are dazzled by the bigness of Mr. Stubbs' salary and the great extent of territory traversed by these lines. There are, no doubt, numerous local conditions west of the Rocky Mountains wherein community of interest between the Southern Pacific and these other roads will make possible a good deal of improvement, and the public will, no doubt, be the greatest gainer; but in transcontinental traffic—the feature in which competition between these roads has been most commonly in the public view—those rates which are unreasonably low are kept down probably by water competition and competition of markets, much more than by direct competition between these roads. And the total competitive business must be but a small proportion of the total earnings of either line.

A track brake is no new thing, and the radical objections to it are now well known, at least to railroad men. First, it is not as efficient as the same pressure applied to wheels, just as a skidded wheel is less efficient in stopping a train than the same wheel braked to a point short of skidding. Second, it lifts some of the weight off the wheels, thus adding to the risk of derailment; and third, it is an ugly thing to get through frogs and past other interruptions of the track. The Westinghouse brake, which is illustrated in this issue, must not be regarded as a track brake, which it is not. The track shoe is primarily a means of working the wheel brakes. Yet regarded only as a brake the track shoe has elements of efficiency and stands in a different class from any other track brake ever brought forward, inasmuch as it actually adds to the wheel pressure in some degree at least. We should doubt if this increased pressure is sufficient to be of much practical value, but so far as it exists it does good. Further, the track shoe acts as an auxiliary to the wheel brake, exerting a considerable retarding effect. Some of the difficulty of passing interruptions in the rail still exist, but it is far less than if there were a rigid mechanical connection between the track shoes and the point from which they are suspended. Taken all in all, this new brake is an apparatus of remarkable interest. We have been somewhat familiar with its development for perhaps a year past, and have looked upon it as being one of the most promising departures in brakes as applied to electrically hauled cars that has ever been brought forward. We are especially pleased therefore to be able now to publish even a short and only moderately satisfactory description of it. One of the beautiful features of this brake ought to be the automatic adjustment of power and adhesion in such a way that the pressure of the brake shoes on the wheels comes only from the track shoe as a result of the drag of the shoe on the rail. But if the rail is slippery, thus provoking slid wheels, the same quality will diminish the drag of the track shoe on the rail. Theoretically, this is attractive, and we are assured that practically it works out. Another fine feature of this contrivance is that the current which energizes the magnets which indirectly set the brakes is generated by the car motors acting as generators, and the performance of a car rigged with this brake going down a steep grade, with the trolley off the wire, and consequently no line current, is a wonderfully pretty thing to see; it takes care of itself. As the speed increases so the current increases and the brakes go on and the speed is again reduced. A still further attractive feature of this combination is the heating arrangement by which the heaters are fed by surplus and otherwise wasted current.

The "Civil" Engineer and Location.

In the report of the Master Mechanics' Committee on Maximum Monthly Mileage occurs this sentence:

"We cannot resist comment on the poor judgment frequently displayed by our civil brothers in engineering when in selecting the cheapest line in the first instance instead of one with a given maximum grade and curve, they only prepare for work that must be done later at enormously increased cost."

Of course these words were written hastily for the members of the committee knew that these faulty locations of which they complain were much oftener the results of economic conditions than of poor judgment on the part of the civil engineers who made them. A great deal of railroad has been built that might have been better in location without costing any more for construction, but even here the fault was often further back than the civil engineer; that is, it often happened that the civil engineer was so hampered for time and money that it was impracticable for him even to make the proper studies before the final location was made.

It is a matter of common knowledge that a very important percentage of the railroad lines of the United States must be revised as to line and grade and rebuilt to greater or less extent, but this is seldom the fault of the engineers who made the original locations. For instance, the Union Pacific is at this moment doing a colossal work. Some of the reconstruction will cost $100,000 a mile. Yet the line was located with great skill and judgment. The Pennsylvania Railroad is another example, possibly even more important, although less obvious, than the Union Pacific. Millions of dollars are spent every year in relocating and rebuilding that magnificent property, and yet nobody pretends that it was not originally located with high professional skill and sound judgment.

In other words, the early railroad builders were obliged to make their locations fit the purse as well as fit the ground. In locating they used precisely the same principle that they used in bridges and other fixed structures. It would have been just as impossible for them to build railroads on ideal locations as it would have been to build railroads with modern steel bridges or stone arches. We had to build railroads and get them running and get the country opened up regardless of the ultimate economy of working those roads. In fact it was largely a case of building a nation. The engineers who worked in Great Britain had an absolutely different situation to meet. There the nation was built, and the costly railroads which our people so frequently criticize were probably in the main correct in principle just as our cheap railroads are correct in principle. Each method was best for its own situation.

Further than this, if the gentlemen of the committee had stopped to think a few minutes they would have realized that the leadership in building up the modern theory of location and construction has mostly been in the hands of the civil engineers. It so happens that the gentlemen who have been writing on this important subject and the gentlemen who have been teaching in the technical schools, in other words, the men who have made opinion, have been civil engineers, so far as we can remember, without exception.

This brings us to another consideration, namely, that the word "civil" ought to be dropped. It is simply an inheritance from the time when it was first used to distinguish the man who bore the title from the military engineer. The civil engineer is an engineer, and the term should be all-embracing. He is not an engineer until he has a fairly accurate and comprehensive knowledge of all of the branches of the profession, including mechanical and electrical engineering. So it happens that in the constitution of the American Society of Civil Engineers it is provided that "a member shall be a civil, military, naval, mining, mechanical, electrical or other professional engineer, an architect or a marine architect." The gentlemen who drew the constitution took the proper view of the profession.

Master Car Builders' Reports.

The M. C. B. reports this year are notable for the amount of work they represent and the number of recommendations made. Especially is this true of the Standing Committee reports, which without exception, contain things of importance and interest, which is not always the case. The Arbitration Committee during the year has rendered thirty-one decisions, or one less than last year. Few changes have been made in the interchange rules for several years, and these have tended to simplify them, all of which may have a good deal to do with the decreasing number of cases sumbitted for arbitration. In 1899 there were 35 decisions, 67 in 1898, then 95, 62, 56, 51 and 63 in 1893. A reprint this year of all the decisions in a separate volume, making it easier to refer to former decisions, should further reduce the number of disputed questions arising under the rules. This year no radical changes in the Interchange Rules have the approval of the Arbitration Committee. A special committee this year presents a revision of the rules for loading long materials on open cars, and another reports a revision of prices used in the rules. The Committee on Standards recommends increasing the diameter of the wheel fit of 80,000 and 100,000 lbs. axles by one-eighth of an inch, so it will be possible to refit these axles with wheels at least three times.

The Committee on Triple Valve Tests reports in detail the test of the "Hibbard" triple valve. This valve for all practical purposes can be said to meet the M. C. B. requirements. Where the results were not strictly in accordance with the code, the desired performance can easily be got by minor changes in the size of openings. Tests of twelve brake shoes of different makes are reported by the Brake Shoe Committee, and these tests confirm the opinion that has been expressed before, that with metal brake shoes the wearing and frictional qualities are so related that an increase in the friction is accompanied by a decrease in the life of the shoe. By varying the hardness of the metal, a wide range of results can be obtained, but long life is invariably got at the expense of the frictional qualities. The committee recom-

mends the following specification for the friction of brake shoes when tested on the M. C. B. machine at Purdue, at initial speeds of 40 miles an hour: Mean coefficient of friction, 25 per cent., with 2,808 lbs. braking pressure; 22½ per cent., with 4,152 lbs., and 20 per cent., with 6,840 lbs. pressure. The coefficient at a point 15 ft. from the end of the stop shall not exceed the mean by more than 7 per cent. We presume that this means 32, 29½ and 27 per cent. under the conditions named, although it might be differently interpreted.

The Coupler Committee has a very interesting report and it has taken several important steps toward the improvement of the coupler. Fortunately this subject has fallen into the hands of some energetic and capable gentlemen, and it is to be hoped that the Association will back them up. Besides modifying some of the coupler gages to insure accurate work, it submits a design for a heavier and stronger coupler. This has a shank 5 by 7 in. instead of 5 by 5 in.; the distance from the back of the lug to the inside face of the knuckle is increased from 8¾ in. to 9¾ in., and the vertical face of the coupler is made 13 in. instead of 9 in. with an 8 in. vertical opening between the lugs for the knuckle. The butt of the coupler has been redesigned. The portion 6½ in. deep is carried forward to make room for a third rivet, and by providing openings at the sides, six short rivets can be used instead of the long rivets as in the present standard. All realize that it is impossible to make a suitable connection with these long rivets, and the new design will doubtless prove to be a big improvement. The new yoke for the heavy coupler is 1¼ by 5 in. The coupler specifications have been revised so as to make the requirements uniform for all couplers, whether they are of cast steel or malleable iron. The ultimate result of this will surely be to retire the malleable iron coupler. These are all Standing Committee reports.

A committee presents new designs for springs for various capacity cars, for arch bar trucks and for pedestal trucks. Apparently the spring question has now been put on a rational basis, where it has never been before. A committee, after consulting with the mill men, recommends that car flooring be two inches thick and of two kinds, square-edged dressed all over, and ship-lapped dressed all over, with the lap symmetrical so that the better side can be used for the upper surface of the floor. Further, that the width be allowed to range from 5 to 10 in. in the rough. It is recommended that siding, roofing and lining be made from 1 in. sawed lumber dressed from 6 in. and 4 in. widths to match up 5¼ in. and 3¼ in. with the tongue and groove in the center. These are common commercial sizes and by using them a lower price for lumber can be obtained.

The Draft Gear Committee presents a preliminary report and gives drawings of recent draft riggings and the results of such road tests as have been made by various people since the last convention. It is the intention to conduct tests of draft riggings during the next year. The Committee on Axles is strongly of the opinion that it is not advisable to decrease the percentage of carbon from that named in the present M. C. B. specifications, and recommends that the chemical composition remain as at present. It adds to the specifications a diagram showing where borings should be made for samples for chemical test; it calls attention to the failure in many instances to make the taper between the wheels straight and uniform, and urges makers to give this point strict attention; it recommends the same increases in the diameter of the wheel fit as are recommended by the Committee on Standards, and suggests a more definite designation for M. C. B. axles, as follows: Axle A, journals, 3¾ x 7 in., designed to carry 15,000 lbs.; B, 4¼ x 8 in. journals, to carry 22,000 lbs.; C, 5 x 9 in. journals, to carry 31,000 lbs., and D, 5½ x 10 in. journals should be used in designing cars where the load on the axle is 38,000 lbs. In this way the weight of the body of the car is introduced as well as the load, and the axle is not selected simply according to the nominal carrying capacity of the car.

The committee on air-brake hose submits specifications which do not differ materially from the specifications presented by Mr. A. M. Waitt at the 1898 meeting. As noted in the review of the Master Mechanics' reports last week, it is deemed inadvisable at this time to establish a joint library with the M. M. Association, and the committee of the M. C. B. Association so reports.

The committee on cast iron wheels considers some details in its report, but does not discuss the really important question of the quality of cast wheels and the possibilities of making a suitable wheel of cast iron for large capacity cars, provided this is not being done at present. The reader is referred to an interesting paper on this subject, by Mr. S. P. Bush in our issue last week, which goes to show that the limit of possibilities in the cast iron wheel has not yet been reached.

New Railroad Building for Six Months of 1901.

Nearly 2,000 miles of railroad was built in the United States during the first six months of this year, according to returns so far received by the *Railroad Gazette*. Much of the mileage included is obtained directly from official sources; the rest is estimated according to facts which have reached this office from various sources. Later returns will undoubtedly add somewhat to the total. The figures given by States, below, show a total of 1,967¾ miles completed during the six months and by 154 different companies. This is a somewhat smaller aggregate than is shown by the latest revised returns for the corresponding six months of 1900, which are placed at 2,110¾ miles, and are given also by States for ready comparison in the accompanying table. We have added the mileage built during the entire 12 months of 1900, and the indications are that the new mileage of the full year will not be quite as large as that of last year.

Texas leads the States for the first six months of this year with 245 miles, and Oklahoma is a close second with 243 miles. The returns show that Georgia built 144 miles, Arkansas 133 miles, Louisiana 103, and Colorado 102 miles. Seven other States built more than 50 miles each. As in recent years, the South continues to show the largest activity in railroad building.

Among the individual companies the Chicago, Rock Island & Pacific leads with no less than 157 miles to its credit. Most of this was on the extension from the Kansas State line across Oklahoma and Texas and toward the proposed junction with the El Paso & Northeastern at Santa Rosa, New Mexico. The St. Louis & San Francisco built 64 miles on the extension down through Indian Territory and into Texas. The Southern Pacific completed 60 miles, mostly in Texas. The Blackwell, Enid & Southwestern and the Great Northern each built 56 miles, the Denver & Rio Grande 47 miles, the Choctaw Northern 40 miles, and the Northern Pacific 39 miles. As a rule the building has been either by the older companies or by new companies closely affiliated with the older organizations.

New Railroad Building by States.

States and Territories.	—Six Months to June 30,— 1901. Companies.	1901. Miles.	1900. Miles.	Year. 1900. Miles.
Alabama	6	44.56	46.02	191.76
Alaska	..	....	....	4.5
Arizona	1	12.5	41.97	65.83
Arkansas	8	133.1	62.	138.5
California	8	31.46	121.6	180.77
Colorado	4	102.5	8.75	128.6
Connecticut	..	....	....	....
Delaware	..	....	....	....
District of Columbia	..	....	....	....
Florida	3	18.9	57.	93.5
Georgia	8	144.5	117.07	172.04
Hawaii	1	3.	....	21.
Idaho	..	....	23.8	49.41
Illinois	4	9.51	44.9	88.9
Indiana	2	50.	34.2	71.5
Indian Territory	1	54.5	45.	177.51
Iowa	2	14.3	149.89	279.26
Kansas	1	10.	....	....
Kentucky	4	29.6	7.	29.9
Louisiana	7	103.5	16.7	219.33
Maine	..	....	....	7.
Maryland	2	32.5	7.	7.
Massachusetts	..	....	....	....
Michigan	5	62.6	37.67	138.65
Minnesota	4	88.32	130.18	256.18
Mississippi	4	44.	109.5	176.12
Missouri	9	78.7	28.5	86.5
Montana	2	45.32	30.5	31.22
Nebraska	..	....	54.	110.9
Nevada	1	24.8	....	....
New Hampshire	..	....	....	18.54
New Jersey	1	3.4	3.36	4.16
New Mexico	1	25.	....	....
New York	1	1.	9.4	12.92
North Carolina	6	44.5	27.	82.26
North Dakota	..	....	26.	118.93
Ohio	7	29.7	23.24	27.1
Oklahoma	5	242.65	90.5	166.4
Oregon	..	....	42.5	66.8
Pennsylvania	11	54.09	126.7	232.12
Rhode Island	..	....	....	....
South Carolina	2	20.25	85.86	168.86
South Dakota	..	....	28.	131.6
Tennessee	6	49.5	68.5	148.02
Texas	12	245.07	173.5	338.23
Utah	1	3.	.25	8.95
Vermont	..	....	25.2	44.79
Virginia	1	5.	36.	65.45
Washington	4	45.76	43.1	89.5
West Virginia	6	50.64	55.75	248.92
Wisconsin	2	8.	17.	114.3
Wyoming	1	2.	55.6	80.6
United States	154	1967.72	2110.71	4894.33

One of the anomalies frequently observable in American state and municipal government is the passage of wholesome laws by one authority only to be followed by attempts, often successful, on the part of another authority to "beat" such laws. Indeed, legislatures are all the time undoing their own work, as, for example, when Massachusetts, having adopted the principle that grade crossings should be made fewer rather than more numerous, added by special enactment more crossings in a single year than could be abolished in several years. An example of cross purposes as between a city and a state has just occurred in Michigan. In that state the railroad commissioner under ordinary conditions may by his disapproval prevent the establishment of new railroad crossings. Recently an electric railroad made application to the commissioner for the approval of a plan for the street railroad to cross at grade the tracks of two railroad companies on one of the principal streets of the city of Flint. The application was endorsed by a number of the prominent citizens of the city, but the commissioner denied it. This action displeased many of the citizens, and an amendment was quietly added to their city charter taking the jurisdiction over crossings within the city limits out of the hands of the commissioner and placing it in the power of the common council of the city. A short time after this action was taken, a leading citizen of Flint, while out driving with his daughter and two other ladies, was struck by a train at a railroad crossing, and all of them were instantly killed. While this accident did not occur at exactly the same kind of crossing as those in controversy, it will, no doubt, serve to impress upon the minds of the people of Flint that all grade crossings are a source of constant danger; that they should be abolished as soon as possible, and that any person or body taking action which tends to increase the number of such dangerous places assumes a grave responsibility.

The German Society of Engineers has undertaken the preparation of a new technological dictionary in the three principal languages, to be known as "Technolexikon." There are already many technical dictionaries, but it is safe to say that those who have frequent occasion to use them are more struck by their deficiencies than by their completeness. And this is not to be wondered at when we consider that almost every handiwork has expressions peculiar to itself, generally quite as unintelligible to the average man, or the well educated man, as words in a foreign language. It is chiefly the hunting up of such expressions that has enabled the numerous recent English dictionary-makers to increase so enormously the vocabularies over those of the "complete" and "unabridged" dictionaries of 25 years ago. A year ago the German Society of Engineers issued a circular letter, the object of which was to ascertain whether it could secure the co-operation of men engaged in many different technical occupations in different parts of the world in the preparation of such a lexicon, provided it would pay for the editorial force and other necessary expenses. It assured itself of the co-operation of technical societies in other countries, and it has been so encouraged that it now announces that the preparation of the first volume, the German-French-English part, will be begun immediately, under Dr. Hubert Jansen, who has already a reputation as a lexicographer, as chief editor. It is to be hoped that there will be wide co-operation, without which no such enterprise can approach completeness; and that it should not be forgotten that in some industries technical American differs widely from technical English. The many scholarly Germans engaged in manufactures and engineering in this country ought to be able to contribute largely to this work.

The Belgian State Railroads abolished the first-class on its railroads about two years ago, but made a contract with the International Sleeping Car Co. to run what we would call parlor cars on certain express trains, for the most part trains which cross the border into France, Germany or Holland. The government now purposes to purchase 44 of these cars, and lease them to the company of which it purchases them, with a contract which will require places in them to be sold to holders of second-class tickets at the rate of 3 centimes per kilometer (0.93 cents per mile). This is just the difference between the second and first-class fares by the old tariff; but the cars will still be limited to a comparatively small number of trains.

The Russian State Railroads in 1900 earned per mile $10,677, which was 2 per cent. more than the year before. The increase in number of passengers and quantity of freight was about the same. The private railroads in the same year earned $8,734 per mile, and nearly 4 per cent. more than the year before. The year was a very unfavorable one for most Russian industries, but there had been what is for Russia a rapid extension of these, and under such circumstances business is often done at a loss when there is in the aggregate an increase in production.

In 1899 the Belgian State worked 2,498 miles of the 2,828 miles of railroad in the Kingdom. The capital expended had been at the rate of $142,550 per mile, including the very large amount of rolling stock. The train movement (freight and passenger together) was equivalent to 19 trains each way daily, which is doubtless the greatest in the world for an entire country. The gross earnings from all traffic were $15,567 per mile, a little less than one-third from passengers. The working expenses were $9,275 per mile, leaving $6,292 of net earnings; a small part of this goes for rentals, but this subtracted the profit is 4.18 per cent. on the State's investment.

The regular rates for passenger traffic on the Prussian State Railroads have remained unchanged since 1890 and before; but so many special suburban and season rates have been introduced, together with lengthening the time round-trip tickets are good, that the actual average receipts per passenger per mile has fallen from 1.184 cents in 1890 to 1.015 cents in 1900, and the passenger traffic (number of passenger miles) has increased 94½ per cent., and the passenger traffic per mile of road 53 per cent., to 608 each way daily.

Master Car Builders' Reports.

(*Continued from page 460.*)

DRAFT GEAR.

This committee presents a preliminary report which includes some discussion of these topics: Car design favorable to the draft gear; draft gear designs and standard metal draft beam. In one appendix are drawings of a number of recent designs of draft gear and in a second appendix are the results of the Santa Fe service tests of draft gear, the Westinghouse road tests, tests of the Sessions gear and service tests of the Dayton rigging made by the Chicago, Milwaukee & St. Paul.

The following extracts are from the report:

The draft gear failures which have been referred to in discussions during the past year seem to be chiefly breakages of the old riggings which were not designed for the work they are now called upon to do. So far as the committee has observed, several draft gears of recent design are showing good results in service. Of course, in considering any record of this kind it must be borne in mind that most of these gears are practically new and also that they are favored by the large number of old cars with weak draft rigging, which fails first and so relieves the rest of the draft gear in the train. This is mentioned here because there seems to be an impression that most of the draft gears now being applied are inadequate, which has certainly not been demonstrated up to this time.

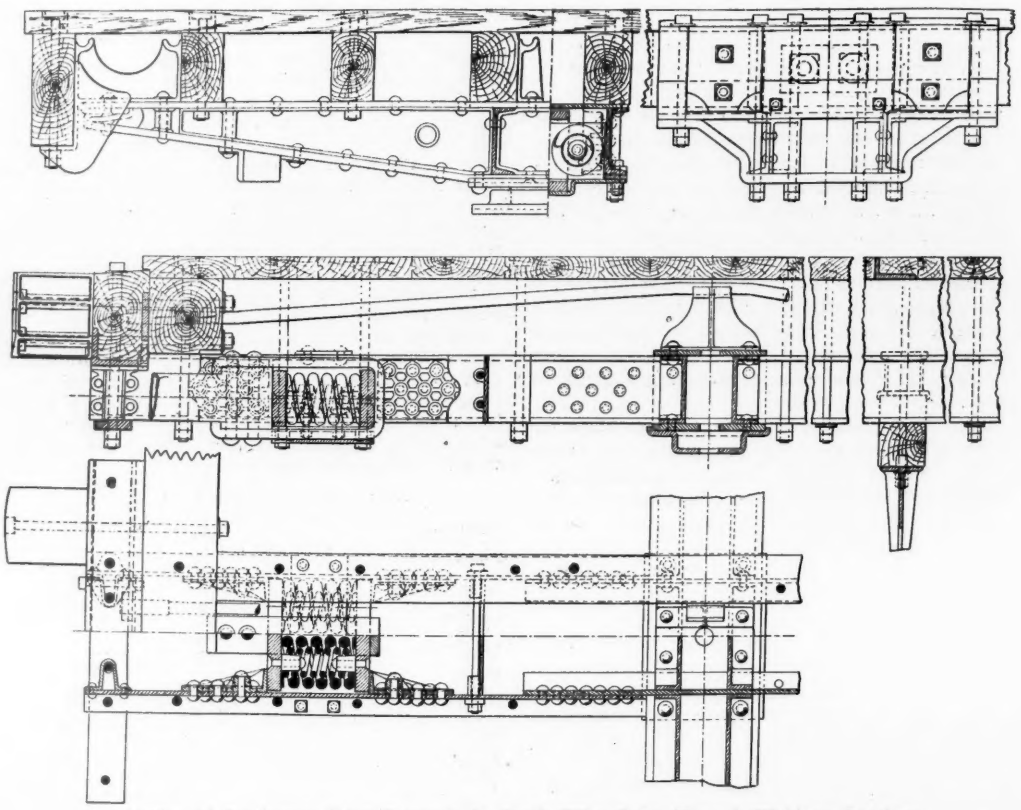
Car Design Favorable to the Draft Gear.—The use of metal underframing, allowing the draft attachments to be placed between and fastened direct to the sills, is looked on as one of the most important steps which can be taken in car design favorable to the draft gear. Experience so far has shown that with metal underframes the front and back follower stops can best be lugs united in one casting with heavy connecting ribs. This gives a large area in contact with the sills and permits of the use of an ample number of rivets. In several cases where single follower lugs have been used, concentrating the strains on a small area of the sill, the webs of the sills have been badly distorted, and in other cases, where the sills had been reinforced, these single lugs have been sheared off. The committee has heard of no cases of failure of sills where both lugs were on a single casting.

Some anticipate trouble from the greater rigidity of the metal frames. To compensate in the metal underframe for the greater elasticity of wood to absorb shocks, one road proposes to place the flanges of the center sills facing each other and put long timbers in between the flanges, extending the full length of the car. To these timbers the draft attachments are then bolted. Another plan is to use a channel end sill filled with a wooden timber which carries the striking plate. Still another design has been used on some Chicago & Alton cars. In this the draft gear in buffing is reinforced by high capacity spring resistance through a range of about ½ in. Another plan is to use spring buffers. The committee is of the opinion that the introduction of steel underframes will favor the draft rigging, eliminating the troubles from loose attachments due to the shrinkage of wood and the backing off of nuts. What the committee considers an important principle is that with metal underframes, and wooden cars with low floors, the line of draft should be on the neutral axis of the center sills. It is realized that it is not always possible to place the draft rigging on the neutral axis of the center sills with this construction, but this does not affect the correctness of the principle. Where the lowering of the car floor is objectionable, the committee recommends that the draft timbers extend at least to the body bolster. There are, however, preferences for continuous draft timbers, and a design in metal is shown by the accompanying engraving, consisting of two unbroken steel channels running from end to end of the car in place of the draft timbers. This is a design of the Lake Shore & Michigan Southern. Another construction recently used by the Chicago, Burlington & Quincy puts the line of draft on a level with the bottom of the center sill; this avoids cutting away the end sill about the coupler.

There would seem to be no reason why there should not be uniformity in new car construction regarding the spacing of center sills. The present recommended practice of the Association is an 8-in. sill spacing. This now seems inadequate, and on account of the general use of both twin and tandem spring arrangements it seems desirable to modify this and settle on two dimensions of sill spacing. The committee suggests 10 in. and 14 in. These dimensions are recommended because one or the other will take, conveniently, any of the draft riggings now being used, and will enable two lengths of follower plates to be used instead of a variety of lengths. The 10-in. center sill spacing is ample for underhung rigging of both the twin and tandem types, and the 14-in. spacing will take any rigging attached between the center sills. In metal construction this wider spacing is also required to enable the rivets at the bolsters to be machine driven. It is recommended that 10 in. and 14 in. be adopted as standard distances between center sills.

Designs of Draft Gear.—While there are two ways of receiving the pulling forces on the car, through attachments at the front end or through attachments at the rear, the principle of all draft gear as regards buffing forces are alike, i. e., the buffing strains are taken by the draft gear proper until the spring or other resistance is exhausted, when the remainder of the shock is transmitted direct to the car framing through the coupler horn or buffer blocks, if present. In the latest draft rigging, the friction gears, the capacity of the gears to absorb shocks has been increased to between 100,000 and 160,000 lbs., leaving a smaller proportion of sho k to be transmitted at the coupler horn, this increased capacity being obtained with practically no recoil. It is readily conceded that the theory of the friction draft gear is correct, but few have had any experience with these gears; they have not been in service long enough to estimate their life or wearing qualities, or in any way determine whether the increased first cost and greater complication is warranted. At the present time the committee has no recommendations to make as between friction and spring gears.

Last year the draft gear committee disagreed as between the tandem and twin spring arrangements. The present committee considers that the arrangement of the springs is largely a matter of preference. Both have advantages and disadvantages. As the tandem arrangement is usually applied, the breaking of one spring does not cripple the rigging as with the twin arrangement; shorter followers can be used with the tandem; the pull is more central and it is easier fitted to old cars with the sills close together. The twin arrangement, on the other hand, permits of a shorter and lighter yoke.



Application of Continuous Steel Channels for Draft Sills—Lake Shore & Michigan Southern.

In some cases the long leverage of tandem yokes causes trouble by shearing off the rivets which join the yoke to the coupler. The rear spring of the tandem arrangement extends back so far from the end of the car that it cannot be inspected without going under the car, and it is doubtful if the rear spring and follower ever gets much attention from the inspectors. None of these objections are very serious, and the committee in its future recommendations will provide for the use of both twin and tandem spring arrangements. The committee is of the opinion that draft gear of the same capacity should be used on small cars as is used on cars of the largest capacity.

Wooden Draft Timbers and Metal Beams.—Metal draft beams are being used extensively in place of wood timbers where the rigging is placed below the sills. These are of a variety of designs; they are of various lengths and are commonly made in each case to suit the car framing. The committee has considered the advisability of recommending a standard spacing of bolts and lugs, with a view to having different draft riggings as a whole interchangeable one with another. It is free to say that the adoption of such a standard has met with little favor and is considered rather impractical even by members of the committee. The point is made, and it seems reasonable, that these metal beams will probably last the life of the car and will require renewal only in case the cars are broken in wrecks. If the metal beams do not do that, they will fail to meet the expectations of designers. With this in view, it seems hardly worth while to attempt to standardize this detail as a good deal must be sacrificed for the sake of uniformity. Any such general scheme for a standard spacing of bolts and lugs would, first of all, mean the doing away of the shoulder at the sill or dead lock, as it will readily be seen that the location of this shoulder from the end of the beam is governed by the car framing; that is, by the sizes of timbers used and also by whether a dead wood is used outside the end sill. The lug or lugs would then be the only projections above the upper face of the metal beam, and these could easily be located at a fixed distance from the end of the beam. In the same way the vertical bolts holding the beams up to the sills would all have to be in line and a fixed distance from the inner face of the center sill, and the bolt spacing would need be a rather arbitrary one. To insure that one draft rigging as a whole would interchange with another, the distance from the bottom of the sills to the line of draft would have to be fixed. It would not be hoped to make so good a construction in this way as by designing the metal beams with ample shoulders to suit the car framing. The committee merely presents this idea to the convention for discussion, as some have expressed themselves in favor of a standard metal draft beam.

M. C. B. Recommended Practice.—The committee does not feel at this time that it is in position to recommend anything in the way of detail designs to take the place of the present recommended practice for coupler attachments, but it hopes to get from the discussion of the topics suggested and from the tests to be made the data needed to make final recommendations.

This report is signed by E. D. Bronner, Chairman; C. M. Mendenhall, Mord Roberts, T. A. Lawes, and Geo. F. Wilson.

The Massachusetts Legislature.

The Legislature of Massachusetts, which adjourned on June 19, devoted considerable attention to street railroad questions, but not much to steam roads. There were the usual number of efforts to secure state ownership of all railroads, but the committee on railroads, without much ceremony, after a short hearing, reported leave to withdraw on these propositions. Among the crude bills was one to require railroads to furnish sleeping accommodations on all passenger cars at night. The Roslindale district of Boston asked for 5-cent fares everywhere in Boston. Several bills were introduced to increase the number of workingmen's trains to and from Boston, but the railroad committee sustained the railroad commissioners, who had decided that no more such trains were needed. Bills for 2-cent fares on all railroads met the usual fate.

The committee reported "no legislation necessary" on the annual report of the railroad commissioners.

An effort to give the railroad commission authority over express rates was rejected. Another measure, several years old, for equal terms to all express companies on railroads, was reported adversely.

A law was passed prohibiting the forgery or counterfeiting of tickets or passes, with a maximum penalty of three years' imprisonment. The statute is comprehensive, covering the uttering or publishing false tickets, imitating a railroad company's stamp and the use of a genuine stamp without authority. A law was passed forbidding the Union Freight railroad to move cars over its tracks in Atlantic avenue and other streets in Boston, except at night. There was a determined attempt to take up and revise the laws forbidding stock watering, but the matter was finally left to be considered by a special committee of 51 members which is to consider a general revision of all the laws of the state. This general revision was begun five years ago and will come up for final action next November.

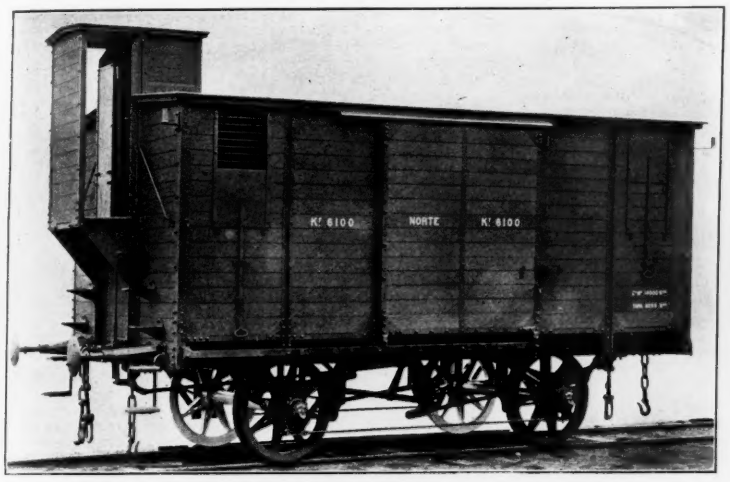
The state has made a marked change in its policy by appropriating $25,000 toward rebuilding the bridge over the Merrimac River between Newburyport and Salisbury. The street railway crossing this bridge is assessed for a part of the cost.

The usual appropriation of $500,000 was made for continuing the construction of state highways, which will include a number of bridges. A special commission will report to the next Legislature as to the feasibility

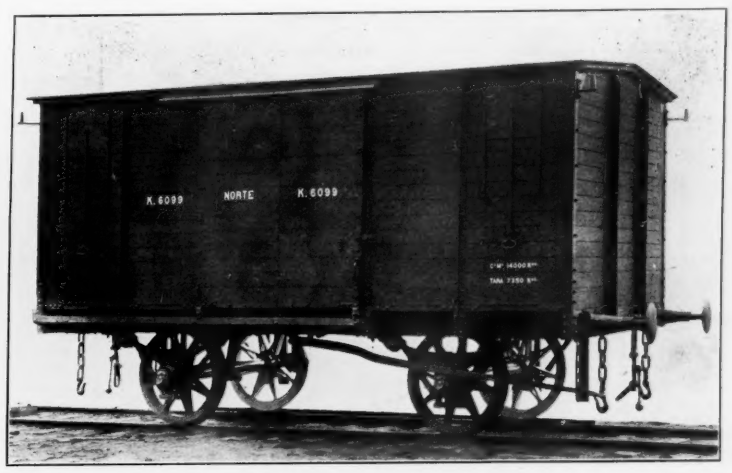
of building a dam or a bridge and dam from Boston to Cambridge across the Charles River, thus creating a great water park in the Charles River basin. The general court refused to take action this year on the question of a drawless bridge between Cambridge and Boston. An effort is being made to construct the new West Boston bridge without a draw.

Freight Cars for the North of Spain Railroad.

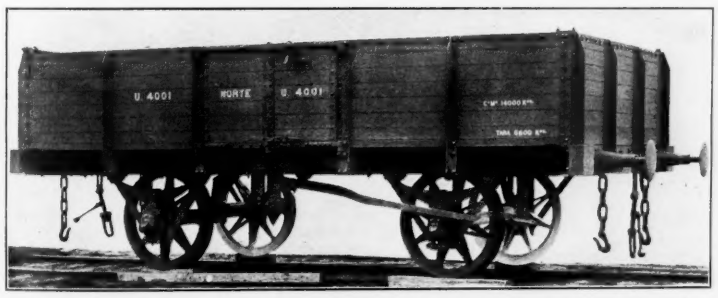
The American Car & Foundry Co. is just completing some freight cars for the North of Spain Railroad which were built from designs furnished by the road. These cars are interesting as examples of European practice, and on account of their novel details shown by the engravings. They were built on this order, 75 open cars of the U class; 25 open cars of class Uf; 40 box cars of class K and 100 box cars of class Kf. It will be noted that about one car in four has a brakeman's box and screw brakes, while the others have the so-called hand brakes only. On the latter the brakes are applied from the ground by a lever at the side of the car, and are used in switching cars. Steel tired wheels are used one meter in diameter and of the twin-spoke pattern, having forged hubs and steel tires. The axles are steel with approximately 3½ x 7-in. journals, the whole axle being turned. The journal boxes are cast-iron and have cotton wick grease pads held up by springs. Fiber dust guards are used. The buffers, coupling apparatus, safety chains and draft rods are in accord with continental practice.



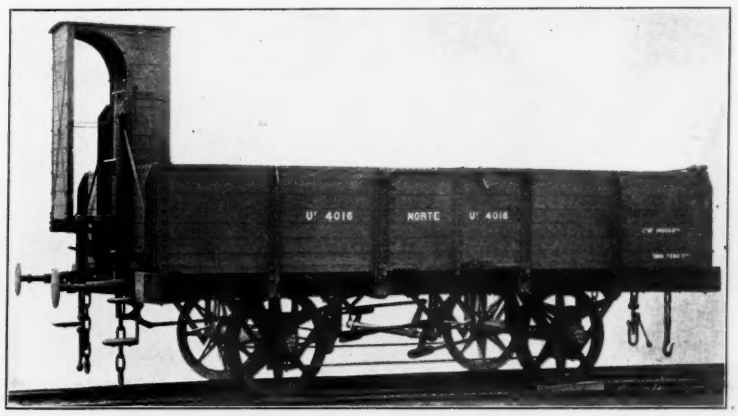
Class Kf Box Car—North of Spain Railroad.



K Box Car—North of Spain Railroad.



Class U Open Car—North of Spain Railroad.



Class Uf Open Car—North of Spain Railroad.

Steel underframes are used in all these cars, showing the preference of the road's engineers in this particular. The main sills, 10-in. channels, are placed directly behind the side buffers and the sides are supported by brackets which in turn are joined to the metal side stiffeners. The end sills are 10-in. channels, the floor beams 7-in. channels and the floor stringers are 4-in. channels. The side and end sheathing and the flooring is wood, the sheathing being 1⅜ in. for the open cars and 1 in. thick for the box cars. On the latter ⅞-in. wood roofing is used, covered with tarred paper sanded. The flooring in all the cars is 1⅞ in. thick.

The track gage is 5 ft. 6 in.; the length over end sills, 19 ft. 8¼ in.; the wheel base, 10 ft. 6 in.; distance from center to center of buffers, 6 ft. 4¾ in. and the center of the draft gear above the rails is 3 ft. 5⅝ in. These dimensions are common to all four classes of cars.

In the open cars, class U and Uf, the length inside is 19 ft. 5½ in.; the width over sills, 9 ft. 11¾ in.; the width inside, 9 ft. 5½ in.; width over side stiffeners, 10 ft. 4⅛ in. and the height from the floor to the top of the sides is 2 ft. 11¼ in. From the rail to the top of the brake van of the Uf cars is 11 ft. 4¾ in.

The dimensions of the box cars are: Length inside 19 ft. 6¼ in.; width over sills is 9 ft. 8⅛ in.; width inside, 9 ft. 6 3-16 in.; width over side stiffeners, 10 ft. 4⅛ in.; from the rail to the top of the roof is 11 ft. 4½ in. and from the floor to the top chord is 6 ft. 7½ in. From the top of the rail to the tp of the brake van of the Kf cars is 13 ft. 5⅛ in.

All these cars have an approximate capacity of 30,800 lbs. The light weight of the Class U open cars is 14,500 lbs.; the Class Uf open cars, 16,000 lbs.; the Class K box cars, 16,200 lbs., and of the Class Kf box cars the light weight is 18,160 lbs.

TECHNICAL.

Manufacturing and Business.

H. Raynar Wilson, late Signal Superintendent of the Lancashire & Yorkshire, who has lately begun business as a dealer in railroad specialties, has opened an office in London, at 28 Victoria street, Westminster. Mr. Wilson is the agent of the Hall Signal Company for Great Britain and the British Colonies.

Wm. B. Scaife & Sons, of Pittsburgh, Pa., have been awarded a contract by the Mexican Central R. R. for a large steel frame pier to rest upon galvanized steel cylinders 72 in. in diameter, made of ⅝-in. plates. Owing to the great bulk of the cylinders, Wm. B. Scaife & Sons will be obliged to build an addition to their large galvanizing plant, especially adapted for this purpose.

The Stanley Electric Manufacturing Co., of Pittsfield, Mass., has voluntarily granted its employees a nine-hour working day with ten hours pay, besides a 5 per cent. increase in wages. The company has recently completed new shops at Morningside on the line of the Boston & Albany, and reports that orders are already in hand sufficient to keep these shops running day and night for the ensuing year.

Cecil B. Smith, Mem. Can. Soc. C. E., Assistant Engineer, City's Engineer's Department, Toronto, Canada, and formerly Assistant Professor of Civil Engineering, McGill University, and Mr. W. S. Aldrich, Mem. Am. Inst. E. E., Mem. Am. Soc. M. E., Professor of Electrical Engineering, University of Illinois, have opened an office as consulting engineers, Rooms 101-103 Mail and Empire Building, Toronto.

Detroit lubricators, made by the Detroit Lubricator Co., Detroit, Mich., have been specified for use on the following locomotives: 25 ordered by the Chesapeake & Ohio from Richmond; 43 ordered by the Erie from Baldwin & Brooks; 20 ordered by the Flint & Pere Marquette from Brooks; 47 ordered by the Chicago, Milwaukee & St. Paul from Baldwin; 85 ordered by the Baltimore & Ohio from Baldwin, Richmond & International Power Co.; 25 ordered by the Texas & Pacific, and 26 by the International & Great Northern from Cooke; 5 ordered by the Cotton Belt from Pittsburgh, and 15 ordered by the Missouri Pacific from Brooks.

From a trade circular which we received from the Allis-Chalmers Co., which company, as we noted in a recent issue, has acquired the Edward P. Allis Co., Frazer & Chalmers, Gates Iron Works and Dickson Mfg. Co. (exclusive of locomotive department), we learn that the general offices of that company will be in the Home Insurance Building, Chicago, Ill. This company will build under the same management the same lines of machinery as heretofore made by the constituent companies, which include all kinds of engines, pumps, compressors, air compressors, rock and ore breakers and mining, flour mill, saw mill, cement, coal mining and sugar machinery.

Pawling & Harnischfeger, of Milwaukee, have recently received orders from the Midvale Steel Co. for six cranes, ranging from 10 to 60 tons capacity, three of which will be equipped with auxiliary hoists ranging from 3 to 10 tons; from the Wheeling Mold & Foundry Co., two 20-ton and one 10-ton cranes; from Hood Machine Co., one 12-ton crane; from Mountain Copper Co., one 25-ton; from New York Shipbuilding Co., duplicate order for one 15-ton double trolley crane; from U. S. Government, New Printing Office, one 25-ton crane; E. Hodge & Co., one 15-ton crane; from National Steel Castings Co., one 20-ton crane with 5-ton auxiliary hoist; from Erie City Iron Works, one 25-ton crane with 5-ton auxiliary hoist and one 10-ton crane; Vilter Mfg. Co., one 30-ton and one 15-ton cranes; from Wisconsin Bridge & Iron Co., one 15-ton crane; from Butte City Water Co., one 20-ton double trolley crane; from Farrell Foundry & Machine Co., one 20-ton crane.

The B. F. Sturtevant Co. has recently bought a tract of land at Hyde Park, Mass., containing about 15 acres, and is preparing plans for building a large plant for making blowers, engines, motors, forges, heating apparatus, etc. This is the result of the rapid growth of the company during the past few years and of the congested condition of the present plant, and is hastened by the recent fire by which the present plant was damaged. The new site is on the line of the New York, New Haven & Hartford R. R., five miles from the old plant and less than ten miles from Boston. It abuts upon the railroad for 1,300 ft. on one side, a stream of water marking the boundary on another side. The high ground will accommodate buildings having a floor area of 750,000 sq. ft., and the lower land furnishes abundant area for dumping. The new plant will be arranged to reduce to a minimum the labor cost of handling material, and will provide for its direct progress through the shop from foundry to shipping room. It will be equipped throughout with new modern tools and labor-saving devices.

Iron and Steel.

The 10,000-ton rail and 10,000-ton steel sleeper contracts for the railroad between the Gold Coast and the Niger have been divided between three Belgian concerns, the Cockerill Co., the Ougree Co. and the Angleur Co. French, English, German and American firms submitted tenders.

The Cohoes Rolling Mill Co. was incorporated in New York State June 11, with a capital stock of $500,000, to make and deal in iron and steel. The directors are Geo. H. Page and Samuel T. Page, of Waterford. Others interested are Ella P. Cragin, of Buffalo, and Albert W. Powers, of Troy.

The bridges which the Chicago, Indianapolis & Louisville will build this year are: On the First Division four deck spans and deck girders over the Tippecanoe River at Monticello, and one through span over White River at Broad Ripple. On the Second Division, two deck girders at Walnut Creek north of Greencastle; two deck

girders at Clear Creek, Harrodsburg, Ind.; and one through span at Middle Salt Creek, south of Logan. These bridges have been contracted for with the American Bridge Company, and will be built during July and August.

Officers of the Master Mechanics' Association.

The following were elected officers of the Master Mechanics' Association to serve during the ensuing year: President, A. M. Waitt, New York Central & Hudson River; First Vice-President, J. N. Barr, Baltimore & Ohio; Second Vice-President, G. W. West, New York, Ontario & Western; Third Vice-President, F. A. Delano, Chicago, Burlington & Quincy, and Treasurer, Angus Sinclair. Mr. J. W. Taylor was reappointed Secretary of the Association.

Prussian Locomotive Contracts.

The Prussian State Railroads have recently given out contracts, all to Prussian works, for 305 locomotives, all to be completed before April, 1902. The aggregate amount to be paid for them is $4,165,000—an average of $13,688 each.

Simplex Bolsters at the Pan-American Exposition.

The exhibit of the Simplex Railway Appliance Co. at the Pan-American Exposition consists of body and truck bolsters for 30 and 40-ton cars and Susemihl roller side bearings for both freight and passenger cars. The growth of the business of this company is remarkable. Starting in a small way four years ago, the business now exceeds $2,000,000 annually. The plant at Hammond, Ind., has a capacity of 400 bolsters a day, and this output has recently been exceeded. When orders now on the books are filled, there will be more than 200,000 of these bolsters in use on something like 60 different railroads and on cars owned by private lines.

M. C. B. Association Officers.

The following were elected officers of the M. C. B. Association for the ensuing year: President, J. J. Hennessey, Chicago, Milwaukee & St. Paul; First Vice-President, J. W. Marden, Fitchburg R. R.; Second Vice-President, F. W. Brazier, New York Central & Hudson River; Third Vice-President, W. P. Appleyard, New York, New Haven & Hartford, and Treasurer, John Kirby, Lake Shore & Michigan Southern. Mr. J. W. Taylor was reappointed Secretary. The following were elected to fill vacancies in the Executive Committee: T. W. Demarest, Pittsburgh, Cincinnati, Chicago & St. Louis; W. Renshaw, Illinois Central, and J. T. Chamberlain, Boston & Maine. Members of the Executive Committee holding over from last year are: E. D. Bronner, Michigan Central; J. H. McConnell and W. Apps, Canadian Pacific.

American Locomotive Company.

At a meeting of the stockholders of the American Locomotive Co. the following directors were elected: Pliny Fisk, George R. Sheldon, S. R. Callaway, W. Seaward Webb, J. E. French, S. L. Schoonmaker, of New York city; A. J. Pitkin, Schenectady, N. Y.; Joseph Bryan, Richmond, Va.; F. H. Stevens, Buffalo, N. Y.; Charles Miller, Franklin, Pa.; George W. Hoadley, Providence, R. I. At a meeting held by the directors the following officers were elected: President, S. R. Callaway; Vice-President, A. J. Pitkin; Second Vice-President, R. J. Cross; Secretary, Leigh Best; Treasurer, C. B. Denny; Comptroller, C. R. Patterson. The Executive Committee of the company consists of Pliny Fisk, George R. Sheldon, S. R. Callaway, A. J. Pitkin and J. E. French. The general counsel of the company, Reed, Simpson, Thacher & Barnum. The general offices of the company are located in the Broad Exchange Building, New York. A certificate has been filed with the Secretary of State of New York announcing an increase in the amount of capital stock from $50,000 to $50,000,000, of which $25,000,000 is to be preferred stock.

THE SCRAP HEAP.

Notes.

It is announced that the Erie road is now using hard coal on all of its passenger engines in Indiana and Illinois.

The Boston & Albany is now running its passenger engines through between Boston and Albany, 200 miles, the men changing at Springfield midway. This plan was tried several years ago, but after a few months was given up.

A press despatch from San Francisco says that the Southern Pacific will hereafter require every station agent to make a special report of the business of the station each week, accompanied by a comparison of the earnings with the corresponding week of the preceding year.

Traffic Notes.

The Canada Atlantic has taken a boatload of wheat through from Chicago to Montreal in five days. The water journey to the Western terminus of the railroad took 65 hours.

Dr. S. J. MacLean, Professor of Economics in the University of Arkansas, has been appointed by the Government of Canada to investigate the rates for the transportation of passengers and freight on the railroads of the Dominion. Dr. MacLean is a Canadian, and has given much study to transportation problems.

The Railroad Commission of Georgia has issued a rule forbidding railroads to discriminate between individuals or between connecting railroads. The rule has two clauses, which put in formal shape, for permanent application at all places, the opinion of the Commissioners in the case recently decided against the Georgia Northern for refusing to accept certain freight from the Tifton, Thomasville & Gulf.

The Trunk Lines announce that round-trip tickets at reduced rates will be sold from Chicago to New York beginning July 1 and continuing until Oct. 20. Three grades of rates have been established. Tickets over differential lines will be sold for $31. Tickets reading over a differential line one way and returning over a standard line will be sold for $33. Tickets good over a standard lines both ways will be sold for $35. These tickets will afford reduced rates by all of the Trunk lines carrying passengers between New York and Chicago, and are made to meet the complaint of the more southerly lines, that too much business was going by way of Buffalo. The reduced rates from Chicago to the Pan-American Exposition, added to the regular rates from Buffalo to New York and return, make a combined through rate by which the routes through Buffalo had an advantage over those passing through the more southerly gateways.

Railroad Extension in Guatemala.

The Vice and Deputy Consul-General of Guatemala writes that the Guatemala Central R. R. (Gen. Thomas H. Hubbard, of New York, President) has now in operation 129 miles of road in this Republic, the main line of 75 miles connecting Guatemala City with San José de Guatemala, an important port on the Pacific, and a branch line of 33 miles from Santa Maria to Patalul. There are five miles of suburban road and 16 miles used exclusively for wood, timber, ballast, etc. Congress, on April 19, approved of a contract for building 34 miles of new line from Patalul to Mazatenango, at which point connection will be had with the Occidental R. R., thus placing the capital in direct communication by rail with the north and west provinces of the Republic. Work on this new line will commence immediately and be completed within two years. Much time must be lost in construction every year because of some five months of heavy rains, which completely inundate the lowlands. The concession will last 15 years.

With the completion of the Northern R. R. from Puerto Barrios, on the Atlantic, to Guatemala City, there will be a perfect railroad system throughout the Republic, all lines of uniform gage of 3 ft. The Northern has now in operation 134 miles from Puerto Barrios to El Rancho, leaving 62 miles yet to be built, the work upon which is progressing rapidly.

The Yankee Peril.

Under the name of "Le Péril Yankee" M. Haguet, Editor of the *Journal des Transports*, tells his readers what he thinks about what has been going on recently among American financiers:

Journals in both worlds have made a great noise concerning the transactions of one of the transatlantic money kings, M. Pierpont-Morgan, organizer of formidable trusts and speculator, with his stomach well lined with dollars. We shall not pretend to give here the plans of M. Morgan and his friends, which, in fact, they have forgotten to make known to us. But we shall be very much deceived if the double victory of the Morgan-Gould syndicate has not for its first chief end a plan to inundate with Yankee coal the markets of the old Continent. By the purchase of two steamship companies it will be possible to carry across the Atlantic for a trifling price hundreds of thousands of tons of coal which the incredible richness of the American mines permits them to dig with impunity and to export with profit. The two lines recently bought can transport 5,000,000 tons of freight a year, and thus they may serve the steel trust in the same way as they will serve the coal trust. Then Germany would have to look with special interest at the doings of these millionaire Yankees. As for us, American opinion does not bother itself about us very much just now, as we are thought to be too weak among the industrial powers. [illegible] see about that later. Public opinion in [illegible] Germany has become resonant over the [illegible]ters. With us people do not talk much [illegible]t, other than to admire the audacity and the [illegible] these colossal speculators who buy ships by the [illegible] locomotives by the thousand between two glasses of water at the springs of Aix-les-Bains. All the [illegible] little coal miners would do well to watch henceforth [illegible]ssibility of this Yankee peril and to send trusty agents [illegible]e if it is true that Pennsylvania produces coal, and [illegible]e if M. Morgan is as people tell us, really an American financier.

New Pennsylvania Terminals at Washington.

On June 12, the Commissioners of the District of Columbia formally approved the plans of the Pennsylvania R. R. for the elimination of grade crossings and a new passenger station at Washington, D. C. The plans, as finally agreed upon, are but slightly changed from those originally discussed, some account of which was given in our issue of Feb. 22, page 130. There is now nothing in the way of beginning actual work, which, it is understood, will shortly be commenced. Instead of one double-track tunnel on the line of Virginia avenue, from Second to Eleventh streets east, there will be two single-track or "twin" tunnels through which trains to and from the north will pass. Inbound trains on leaving the tunnel at Second street east will begin to go up the elevated structure, which will extend from that point to the station at Sixth street, S. W. The southbound tracks will be elevated from Sixth street to Ninth street, S. W., from which point they will gradually come down to grade, beyond which streets will be depressed and pass under the tracks. The station building will be similar in general plan to the Broad street station in Philadelphia, the trains entering on the level of the second floor, and passengers being taken by elevators from the street level. As yet there has been no announcement regarding the proposed new terminals for the Baltimore & Ohio.

Trade Marks.

The Atchison, Topeka & Santa Fe has adopted a new design for trademark use. It is a plain Greek cross in a circle, blue on a white field, lettered with the name "Santa Fe" in white. The origin of the idea is traced back to the cross of the early Spanish missionaries, who founded the old "City of Holy Faith" in New Mexico.

The Chicago & Alton has adopted a coat of arms for its advertising publications. There are helmet and shield, suggesting protection. The crest holds the headlight for safety; wings suggest speed, and there is a ribbon setting forth the road's claim to be "the only way."

The Illinois.

The battleship "Illinois" on her trial trip June 12 on the deep-water course made an average speed of 17.31 knots for four consecutive hours, which is the best record so far made by a ship of her class. For part of the time she made 17.84 knots. At the end of the run she was turned, describing a complete circle within 300 yds., or a little over twice her own length, in 3 min. 10 secs., while running at full speed. The "Illinois" was built at the yards of the Newport News Shipbuilding & Dry Dock Co., and is sister ship to the "Wisconsin," built at the Union Iron Works, San Francisco, which made 17.12 knots on her trial trip, the contracts for both ships calling for 16 knots for four hours. Both ships have twin screws, 10,000 i.h.p., and 11,525 tons displacement.

Potomac River Improvement.

Col. Allen, Corps of Engineers, U. S. A., in charge of Potomac River work, has reported to the Chief of Engineers that the Atlantic, Gulf & Pacific Co. has completed the dredging of the Washington channel, which is now 400 ft. wide and 20 ft. deep, from Long Bridge to the junction of the Washington and Virginia channels. The material removed was deposited on the reclaimed area, the embankments for retaining the dredged material being practically completed. The large area new reclaimed was formerly the Potomac flats. The contractors will now take up the dredging of the Virginia channel above the Long bridge. Dredging has also been resumed at Mattawoman shoal in the lower Potomac.

Improvements at the Washington Navy Yard.

Work on six new buildings at the Washington Navy Yard is well advanced. A new sea wall has just been completed, and the grade of the lower end of the yard will be raised 4 ft. The main gun shop has been extended 200 ft. at the south end and 60 ft. at the north end and a large tool shop is completed. A model dispensary for the prompt treatment of accident cases will be built, and the chemical and metal testing laboratories will be placed in a specially arranged building. A new plant for making gas from oil is in operation, the gas being conveyed in pipes to all the forges. The present improvements will cost $1,000,000. There are now about 7 miles of railroad track in the yard, and more will be built, and two locomotives and two wrecking cranes are in constant use. The large shops are all furnished with electric cranes, and an electric conduit system is being laid.

Hydrography Under Difficulties.

The Navy Department has received a chart showing a complete new survey of Iloilo harbor, Philippine Islands, which is one of the finest pieces of work ever done by the Hydrographic Office. The surveying party was taken to Iloilo by two gunboats, and it was necessary each morning to bombard the shore with small guns in order to clear out the insurgents before the surveyors could begin work.

Stamps for Freight Packages.

For some time the French State Railroads have issued stamps for the prepayment of freight on freight shipped in moderate quantities. The shipper buys these stamps and sticks them on the freight bill which he hands in with the freight. These are largely used by those who make frequent small shipments to certain large towns, the charges on which are as familiar to them as the postage on letters. The stamps are of six different denominations, from 1 cent to 40. They have proved so satisfactory that the six great companies are about to adopt them.

A Railroad Bridge for Asia.

Consul Hughes, of Coburg, says that, according to Russian official publications, the old wooden boat bridge over the Amu Darja, on the Middle Asiatic Railroad, near Tschardjui, will be repaced by an iron [steel] bridge 5,000 feet in length. The new structure, continues the consul, is to be built in such a way as to prevent the river from shifting the bridge foundations [a praiseworthy thing to do]. According to the plans published, there are to be 24 piers, each about 185 feet apart. The total weight of the structure will be about 5,190 tons, and it is estimated the cost will be about $2,558,500. The consul suggests that this may be an opportunity for American bridge builders, if immediate action is taken.

New Electric Railroad in Russia.

The first electric suburban railroad in Russia was opened for traffic this year. It connects the city of Lodz, in Russian Poland, with the towns of Zgierz and Pabianice, and is 13½ miles long. The Thompson-Houston motors used were furnished by the Russian Electricity Union. The road is owned by a company of Polish merchants and manufacturers and cost $560,000. The charter provides that the government shall receive a share of the profits, and shall have the right to purchase after twenty years; and that the road and all equipment shall become the property of the government at the expiration of twenty-eight years.

Wireless Telegraph on Lake Michigan.

An officer of the Pere Marquette Railroad tells a reporter in Chicago that his company is going to establish communication by wireless telegraph between the company's car ferries on Lake Michigan and stations at Milwaukee, Ottawa Beach, Muskegon, Ludington and Manitowoc, all of which ports are reached by the car ferries. The company has seven vessels carrying freight cars across the lake, and it is calculated that, if means can be provided for prompt communication with the shore in case of an unexpected storm, it will be practicable to load the boats more nearly to their full capacity than has been the custom heretofore. At least a reporter says that an officer tells him this.

A Siberian Butter Express Train.

To favor the exportation of butter from Siberia what is called an "express" freight train consisting of refrigerator cars is dispatched on Thursday of every week from Ob, on the river of that name in Siberia, to the Baltic port of Riga, a distance of 2,780 miles, which is about equal to the distance from Buffalo to Los Angeles. This long run is made in 324 hours or at the average speed of 8.58 miles an hour, which seems quite moderate for an express, even an express freight, and may be compared with the fruit trains over our Pacific railroads. It is said that this train, if not delayed, spends 193 hours and 28 minutes in going over the road and 130 hours and 32 minutes in stops at stations.

Commerce Through the Canals of Sault Ste. Marie, May, 1901.

East Bound.	
Grain, bushels	2,811,928
Flour, barrels	921,393
Iron ore, net tons	1,172,572
Wheat, bushels	5,959,542
Passengers, number	2,664
West Bound.	
Coal, hard, net tons	107,168
Coal, soft, net tons	360,086
Salt, barrels	98,846
General merchandise, net tons	62,179
Passengers, number	3,342
Total freight, net tons	2,245,500
Vessel, passages, number	1,999
Registered tonnage, net tons	2,070,396

Forty Miles an Hour on the Highway.

Railways will soon have to look to their laurels in the matter of high speed. In the Paris-Bordeaux motor-car race this week the 557 kilometers [346.1 miles] were covered in 8h. 44m. [39.63 miles an hour], or about an hour longer than the time usually taken by the Southern ex-

press, one of the fastest trains in the world. The progress being made is evidenced by the facts that in 1895 the time taken was 22h. 25m.; in 1898 M. Rene de Kniff gained the race in 15h. 15m. 31s.; and in 1899 Charron came in first, having covered the distance in 11h. 43m. 20s.—*Herapath's Journal*, May 31.

Local Passenger Steamers on the Hudson.

A small company was recently incorporated, called the Rapid Boat Company, to establish a line of passenger steamers between New York and a few nearby landings on the Hudson River. The plan seems to be to give a fast boat service morning and evening for people living up the Hudson and doing business in New York. This has long appeared to be an attractive scheme and it seems strange that it has not been tried before. It is hardly likely that there is much money in it, but a small service ought not to lose money.

Lake Washington Canal, Washington.

The Puget Sound Bridge & Dredging Co., of Seattle, Wash., has received the contract for dredging the Lake Washington Government canal, and an officer of the company is reported as stating that work will be begun on July 3 on Shilshole Bay, half way between West Point light and the entrance to Salmon Bay. A channel will be dug from that point 6,000 ft. long, extending into the locks at the Narrows in Salmon Bay. From that point on the channel will be deepened and widened by succeeding contracts into lakes Union and Washington.

The Electrifying of the London Underground.

Mr. Yerkes' other big job is the electrification of the Inner Circle, as to his connection with which there is no longer any secret, seeing that Mr. Forbes said in his evidence before the joint committee that "Mr. Yerkes, in his own phrase, was read to post a million sovereigns for the job at any bank in London." In an "interview" with a representative of the *Daily Mail*, the American capitalist is reported to have said: "I have come over here after forming a company which is to change the motive power of the Metropolitan and District Railways from steam to electricity. I now only await the action of the proper authorities and the stockholders and the directors to commence work." But in this poor, benighted country there is a delusion that "the proper authorities" (by which phrase, I suppose, the Board of Trade is meant) and the stockholders and the directors ought to be allowed a full say before a revolutionary change in the working of two important railways is entered upon. It is good of Mr. Yerkes to say that he "only waits" for this; but he may have to wait a weary time. And even if he can bring the Metropolitan and District Companies into complete harmony, there are the railroads who work over the Inner Circle to be reckoned with. Personally, my faith in a speedy solution of this intricate problem has been small ever since Sir John Wolfe Barry threw up the job.—*Transport.*

An "Air-Car" Test.

We have received from Nashville copies of a circular signed "Respectfully, the Air-Car Test. Commission," with the names and titles of four gentlemen. This circular says that the Commission has been formed for the purpose of testing Dr. Brodbeck's "invention of air-cars, a new method of rapid transportation." The authorities of the University of Nashville have put the campus of the Peabody Normal College at the disposition of this Commission for the purposes of the test, and "the tests will be made under the auspices of this University and under the eyes of this Commission." There is a delicate suggestion that contributions of money will be received for carrying out these tests, the result of which "will be of greatest value for all mankind. History has shown that greater facilities of locomotion are equivalent with greater progress in all spheres." We are not told that this circular letter was written under the auspices of the University or that it was scrutinized by the professor of English at that institution; but we had not supposed that "with" is the correct preposition to follow "equivalent" or that "the result will be of greatest value for" is good English idiom, or that "facilities of locomotion" is just the way Shakespeare or even Thackeray would have written it, but being only a journal of transportation we are not expert in language. Certain facts about the air cars are told in the circular letter as below:

"The invention, if successful, will revolutionize all methods of transportation, as its principles are entirely different from all present and past principles of transportation. The leading features of this invention are: the combination of all the advantages of locomotion on terra firma with all the advantages of free aerial flight, without the drawbacks of either; the idea is in particular to make use of the great supporting power of air in rapidly moving objects. Popularly speaking, the invention may be described as an artificial bird, driven by electricity, and gliding along rails or ropes. The start is similar to that of a trolley car. The inventor claims for his invention three advantages: First, greater and almost unlimited speed, as there is practically no friction along the track, except at the start; second, greater safety, as a system of twin-wheels, one above and one below the rail, prevents jumping the track; and, above all, third, greater economy, as with greater speed less power will be required, contrary to all present methods, a fact already established by experiments beyond doubt."

Three of the gentlemen composing this Commission are professors in the University of Nashville, one of physics, and another of biology, and the fourth is described as the General Agent of the General Electric Company and "a practical railwayman." We have no objection to this use of the energies and cash of the members of the Commission; but the University makes a great mistake in lending its name to such an enterprise. Furthermore, it is unjust to the undergraduates in several ways.

Shipbuilding in the United States.

The Bureau of Navigation reports 1,024 steam and sail vessels of 359,789 gross tons built in the United States and officially registered during the 11 months preceding June 1. The number of wood vessels continues to be far greater than those of steel, although the total includes 14 steel sailing vessels and 91 steel steamers. The gross tonnage is about 30 per cent. more than that of the same period last year.

Mechanical Draft.

Probably the greatest advantage of mechanical draft is its flexibility, it being possible to regulate the speed of the fan so the proper combustion for the steam required is maintained independent of the weather conditions, and it is possible to create a greater draft than is possible with a chimney. Still another point in favor of mechanical draft lies in the portability of the fans in case a change of location is desired.

The Harbor of Portland.

The harbor of Portland, Me., has been added to the list of contract ports entitled to the lowest rates for marine insurance, making the sixth grain shipping port on the Atlantic coast of the first rank, so far as safety of navigation goes. Portland now has a good grain inspection system; a pilotage system improved to meet the demands of larger vessels, and greatly enlarged terminal facilities, including piers, docks, warehouses and grain elevators.

Cement for South Africa.

Consul General Guenther writes from Frankfort, April 15, 1901: "South Africa is a good market for cement. While the principal import of cement is from Great Britain, considerable quantities are also imported from Belgium and Germany, the latter, on account of its cheapness, increasing. Belgium cement is of good quality and as cheap as the English article. The reports state that American cement could compete well, as transportation from our country is not higher than from Europe. Cement cannot be manufactured in South Africa.

Mechanical Draft.

An interesting feature of the equipment of the new Olympia Mills at Columbia, S. C., is the mechanical draft apparatus. A steel plate stack extends barely above the roof and draft is produced by two 14-ft. Sturtevant fans driven by direct-connected engines. An outer shell surrounds the stack, and through the annular space air is drawn down into the fan room. The heat thus acquired is further increased by radiation from the fans. This hot air is finally drawn to the fires through ducts extending beneath the ashpits.

Vibration of the Central London.

Lord Rayleigh's Vibration Committee have satisfied themselves by personal inspection of the fact that there is a serious vibration to be felt in many of the houses situate along the course of the Central London. The observations so far made lead the committee to the conclusion that the vibration complained of arises chiefly from two circumstances, namely: (1) The large proportion of the weight of the locomotives not borne by springs, and (2) want of rigidity in the rail. A new type of locomotive, in which the above objection is obviated, has been ordered by the company, and will be tried in the next few months, and the engineers of the company are endeavoring to overcome the difficulties which have hitherto prevented a stiffer rail being tried. When the results of these experiments are known the committee will be in a position to give a more definite opinion than they can do now, both as to what steps should be taken on the Central London to reduce the vibration, and also as to what features should be introduced on new lines. The committee may, in the meantime, say from the information already obtained, they believe that on new tubular railroads, under proper conditions, no objectionable amount of vibration need be apprehended, but they abstain from a definite recommendation until the further experiments above alluded to are completed.

High Platforms in Germany.

The Prussian Minister of Public Works calls the attention of his subordinates to the favorable experience had in certain important stations with platforms 36 in. high above the rails, which have so facilitated the movement of passengers into and out of the cars, and their search for vacant places in compartments before entering, as to save considerable time. The only notable disadvantage has been the greater difficulty in inspecting wheels, lubricating axles, etc. On account of the necessity of free access to couplings, brake hose, etc., a high platform should be on only one side of a track; but the various railroad directories are instructed in case of construction of new stations or the reconstruction of old ones, where there is a heavy passenger traffic, to take into consideration the construction of high platforms, whenever the circumstances will permit them. Those, especially women, cripples and invalids, who have had much experience in the athletic exercises required in climbing into cars at most of our stations will read this with interest; but our cars are so made that high platforms are not easily applicable. Few appreciate the delay caused to movement by the interposition of a single step even.

Compressed Air in a Steam Boiler.

A correspondent living in California recently described a novel method of economizing in fuel. The plant which is at a mine comprises two horizontal return tubular boilers 54 in. in diam. x 16 ft. long, one 12 x 12-in. double cylinder hoisting engine, a 14 x 22-in. duplex air compressor and a smaller steam engine for driving a rock breaker and ventilating fan. The fuel is crude oil. The hoisting and rock breaker engines are steam driven, while a 150-h. p. Westinghouse induction motor drives the compressor, which furnishes air at 80 lbs. pressure for the rock drills. The air compressor was formerly considerably underloaded for the greater part of the time, being worked about 50 per cent. of its capacity. The Electric Power Co. will not furnish less than 200 amperes at a potential of 600 volts, at a reasonable price, and as this amount of current must be paid for whether used or not it was determined to put it to some use with the present apparatus. The motor and air compressor are now worked to their full capacity and the excess of air forced into the steam boiler. When the load on the hoisting and breaker engines is light the compressed air becomes the only motive fluid, the consumption of oil under the boiler falling almost to zero, the boiler merely serving as a heater for the compressed air, while with the usual load the steam is employed to make up the deficiency. The saving in oil under the average full load is claimed to be 250 gals. in 24 hours, which amounts to about $10 per day. The greatest difficulty experienced in thus utilizing the compressed air is said to be in securing proper lubrication of the engine cylinders. The steam is exceedingly dry and when the load is reduced beyond a certain amount the quantity of steam furnished is insufficient to provide the required amount of condensation for the lubricators. It is stated, however, that this difficulty can readily be overcome by employing force feed lubricators.—*The Engineer.*

The Brussels-Antwerp Electric Railroad.

About a year ago the Belgian Government asked Parliament for authority to build, or make preparations for building, an electric railroad between Brussels and Antwerp solely for through express trains. Recently Parliament asked the administration concerning the state of the project, and the answer was that the plan had not been worked out; but that parties had asked for a charter for such a line; and when the government had investigated it sufficiently from a financial standpoint, this would be submitted. Something seems to have cooled the government's ardor for this scheme.

One "Boom" Ended.

It seems to be acknowledged that the "boom" is over in Germany. The Prussian Ministry of the Interior calls for the co-operation of charitable organizations, etc., in finding work for those who have been thrown out of employment, which it is thought may be found on the farms and in the small towns from which many of them have come, and provision is made for carrying by rail those thrown out of work to places where they may earn their bread.

The "Supplymen" at the Conventions.

As in former years, the Supplymen's Association furnished entertainment for members and guests of the M. M. and M. C. B. Associations at the conventions. The attractions, as a whole, differed only in variety from those of other years. The committee and chairmen of each are as follows: Finance, Fred A. Casey, Vice-President of the Ashton Valve Co.; Entertainment, Charles W. Martin, Jr., Jenkins Valve Co.; Carriage, F. K. Shults, National Tube Co., and Printing, J. Alexander Brown, pocket list of railway officials. At a meeting of the supplymen, June 22, a permanent organization was formed, and the following elected to serve from the districts named for the time given: New York, E. A. Simons, Secretary *Railroad Gazette*, two years; New England, Fred A. Casey, Vice-President Ashton Valve Co., Boston, Mass., two years; Philadelphia, W. C. De Armond, President Protectus Co., one year; Cleveland, Pittsburgh, Buffalo and Detroit, D. C. Noble, A. French Spring Co., Pittsburgh, one year; Chicago, George H. Bryant, Thos. Prosser & Son, two years; St. Louis and Southwest, Scott Blewett, American Car & Foundry Co., St. Louis, Mo., two years; Atlanta, Richmond and the Southeast, W. Ross Gravener, American Steel Castings Co., Savannah, Ga., one year, and member at large, Willard A. Smith, *Railway Review*, Chicago, one year. Mr. Fred A. Casey was chosen Chairman and Hugh M. Wilson, Secretary, to serve for the following year.

Disastrous Flood in West Virginia.

A flood in the valley of the Elkhorn River, West Virginia, on Sunday last destroyed a number of villages, many miles of railroad and numerous coal mining and coke manufacturing establishments. It is estimated that about 60 lives were lost, the people in some of the villages being overwhelmed before they could get out of their houses. The valley is the center of the Pocahontas coal region. The Norfolk & Western Railroad was destroyed for many miles, and the officers of the company estimate its loss roughly at $500,000. This includes many bridges, 20 according to one account. It was expected that a temporary track would be restored throughout the flooded district by Wednesday. More than 100 freight cars were wrecked. The town of Keystone was practically wiped out.

A Bridge Wreck in Germany.

At the station Themar, on the Russian State Railroads, there was built this year an iron foot-bridge 60 meters long by 2 meters wide, supported by one iron pier in the center. It was to enable passengers to cross the tracks in the station safely. May 30 last a test of this bridge was begun. Some 20 laborers, under the direction of an engineer, loaded one side of the bridge with 54 tons (118,800 lbs.) of rails. The next day they proceeded to carry an equal weight on the other side of the bridge, when the whole structure collapsed, and all the men on it were injured, six of them severely and two dangerously. There is hardly any service in the world in which an occurrence of that kind was less to be expected.

Car Transfer at the Strait of Canso.

The Intercolonial Railway is having built in England, by Sir W. G. Armstrong, Whitworth & Co., Limited, a screw ferry boat 282 ft. long, 48 ft. wide and 17 ft. deep, to carry cars across the Strait of Canso, Nova Scotia. On the deck of the boat are three tracks. The vessel has a propeller at each end, and is worked by two sets of triple expansion engines, either of which can actuate either propeller.

The St. Louis Exposition and the Railroads.

It has been decided by the Executive Committee of the St. Louis Railway Club to offer a prize of $50 for the best paper of not less than 2,500 words written by a member of the Club and submitted to the Secretary before Aug. 31, 1901, on "The Railway Problem as applied to the forthcoming Louisiana Purchase Exposition, to be held at St. Louis, Mo., A. D. 1903," the Club reserving the right to publish all papers submitted.

Airships.

From Austin, Tex., comes the following despatch:

The charter of the Ezekiel Airship Company, with principal office and factory at Pittsburg, Tex., was filed in the Secretary of State's office to-day. The company is composed of twenty of the leading business men of Pittsburg and they propose to manufacture airships on the plan invented by the Rev. Burrell Cannon, a minister of Pittsburg. The Rev. Burrell Cannon asserts that he obtained his idea as to the new principle which he has adopted in the manufacture of airships from the book of Ezekiel in the Bible and that it is a success. He recently completed his first airship after seven years of work, and the trials which have been made of it at Pittsburg are said to have been highly successful.

We would recommend to the reverend gentleman and his company that he get the assistance of the faculty of Nashville University, Tennessee, in investigating and advertising his airship. That institution of learning appears to have become "consecrated" largely to the airship industry. The reader can hardly help a feeling of gratitude to the Texas reporter who informs us that the book of Ezekiel is in the Bible.

LOCOMOTIVE BUILDING.

The Boston & Albany is having six engines built by the Schenectady Locomotive Works.

The Butte, Anaconda & Pacific is having one engine built by the Baldwin Locomotive Works.

The Newburgh, Dutchess & Connecticut is having one engine built by the Baldwin Locomotive Works.

The Greenwich & Johnsonville, now building, will buy one new locomotive. I. C. Blandy, of Greenwich, N. Y., is President of the company.

The Boston & Maine, it is reported, has placed an order with the Schenectady Locomotive Works for 30 locomotives, six for passenger and the other 24 for freight service.

CAR BUILDING.

The Sierra Valley is having 24 freight cars built by Carter Bros.

The American Car & Foundry Co. has received miscellaneous orders for 24 cars.

The Lake Superior & Ishpeming has ordered one private car from the Pullman Co.

The Louisville & Nashville will build, at its own shops, 250 cars with steel underframes.

The Union Steel Co. is having 40 freight cars built by the American Car & Foundry Co.

The Toledo, St. Louis & Western is having 50 freight cars built by the American Car & Foundry Co.

The Illinois Central has placed an order with the American Car & Foundry Co. for 300 refrigerator cars.

The Alabama & Great Southern has placed an order for 100 box cars with the American Car & Foundry Co.

The Choctaw, Oklahoma & Gulf has ordered eight coaches, 15 partition coaches and five chair cars from the American Car & Foundry Co.

The Manhattan Elevated has ordered 100 motor cars. Fifty of these will be built by the Wason Mfg. Co., and 50 by the American Car & Foundry Co.

The Philadelphia & Reading, it is rumored, has placed an order with the Cambria Car Co. for 500 steel cars, in addition to those ordered some time ago, and will build at its own shops 200 freight cars.

The Chicago & Alton has ordered 400 steel cars from the Pressed Steel Car Co. One hundred and fifty of these will be hopper bottom gondola cars of 100,000 lbs. capacity, similar to those built for the Erie. They will weigh 35,514 lbs. and will be 31 ft. 6 in. long over all; 30 ft. ¼ in. long inside; 10 ft. wide over all; 9 ft. 6 in. wide inside; sides 10 ft. high above rail. The other 250 will be flat bottom gondola cars similar to the 600 cars already built for this road. They will be of 100,000 lbs. marked capacity and will weigh 35,600 lbs. They will be 43 ft. 3 in. long over end sills; 41 ft. 9 in. long inside; 10 ft. wide over side stakes; 9 ft. 4⅞ in. wide inside; 7 ft. 8¼ in. high from top of rail to top of body. All the cars will be equipped with gray iron journal boxes; P. R. R. draft rigging; M. C. B. journal bearings; Schoen trucks.

The Philadelphia & Reading, as noted in our issue of June 21, has placed an order with the Pressed Steel Car Co. for 1,000 low side gondola cars and 100 flat cars, to be built entirely of steel. The gondola cars will be of 110,000 lbs. capacity, similar to the low side gondola cars already built for this road. They will be 35 ft. 10½ in. long over end sills; 34 ft. long inside of body; 9 ft. 11⅝ in. wide over side stakes; 9 ft. 4 in. wide inside of body; 5 ft. 3¼ in. high from top of rail to top of body; 1 ft. 1 in. deep from floor to top of sides. The cars will be equipped with Fox pressed steel pedestal truck frames, cast-iron chilled wheels, open-hearth steel axles, Westinghouse air-brakes, pressed steel brake-beams, and Chicago M. C. B. automatic couplers. The flat cars will be of 110,000 lbs. capacity and will have steel floors. They will be 35 ft. 6 in. long over end sills; 9 ft. 6 in. wide over side sills; 10 ft. 1¾ in. wide over side stakes; 3 ft. 6¼ in. high from top of rail to floor. They will be equipped with Fox pressed steel trucks; cast-iron chilled wheels, open-hearth steel axles, Westinghouse air-brakes, pressed steel brake-beams and Chicago M. C. B. couplers.

BRIDGE BUILDING.

ADA, MINN.—Bids are wanted, July 9, for two steel bridges, 60 and 70 ft. E. J. Herringer, County Auditor.

BEAVER CITY, NEB.—Bids are wanted, until July 9, by the Commissioners of Furnas County for bridges as follows: 28-ft. and a 32-ft. steel span near Wilsonville; 28-ft. steel span near Beaver City and a 36-ft. steel span northeast of Edison. Address T. F. Newton, Clerk.

BINGHAMTON, N. Y.—The Committee on Streets and Bridges has reported in favor of a new bridge across the Susquehanna River at the foot of Exchange street. The present footbridge is condemned.

BLOOMFIELD, IND.—Bids will be wanted by the County Commissioners, on July 1, for two steel bridges, one over Richland and the other over Hewesville Creek. The spans are 65 and 40 ft. respectively. H. L. Doney, Auditor.

BLOOMINGTON, NEB.—F. W. Harris, County Clerk, will receive bids, until July 9, for a steel bridge over the Republican River south of Bloomington. Contractors must furnish their own plans and specifications. The bridge will be about 265 ft. long, with a 16-ft. roadway. Bids will be received on either a two, three or four-span bridge.

CHATHAM, ONT.—It is proposed to build a bridge over the Thames River at the Raleigh and Tilbury town line connecting Dover East.

CINCINNATI, OHIO.—According to report, the city is considering the advisability of building a new bridge over the Miami River at Main street.

CLINTON, IOWA.—According to report, engineers of the Chicago & Northwestern are making a preliminary survey for a double-track bridge over the Mississippi River at this place.

COLUMBUS, GA.—A committee, of which Mayor L. H. Chappell is chairman, is considering the erection of a steel bridge over Chattahoochee River, at Fourteenth street, which is estimated to cost $42,000. No definite plans are made. Bonds will be issued.

COHOES, N. Y.—Plans are being made by the State Engineer for a steel bridge over Champlain Canal at Ontario street. The appropriation is $13,000.

COLUMBUS, MISS.—The Clerk of the Board of Supervisors of Lowndes County will advertise for bids for a bridge over Block Creek.

COSMOS, MINN.—We are told that the County Commissioners will open bids, on July 9, for a bridge over Crow River, near Cosmos.

DANVILLE, ILL.—The Bridge Committee of the County Board wants bids on the Swift bridge, seven miles west of the city, on Glenburn road. Later bids will be asked for a bridge over the Salt Fork near Fairmount and over the Little Vermilion, near Sidell.

DUBLIN, GA.—Bids are wanted, on July 30, at the office of the County Commissioners for building 1,100 ft. of steel bridging, according to the plans and specifications on file in their office. Wm. Kea and John M. Blackshear are members of the Commission.

FORT WORTH, TEXAS.—Bids will probably be wanted in a few days by John B. Hauley, City Engineer, for the large wooden trestle to be built at Jennings avenue over the Texas & Pacific tracks. It will be 1,200 ft. long and will cost about $30,000.

GARFIELD, N. J.—The Board of Freeholders has appropriated $35,000 toward a bridge at Monroe street and $6,000 for a bridge over Saddle River in Garfield.

HICKORY, N. C.—Bids are wanted, July 1, by a committee composed of O. M. Royster and J. D. Elliott, for a Howe truss steel and wood bridge about 800 ft. long, to cross Catawba River on the public road.

INDIANAPOLIS, IND.—The Board of Works has adopted specifications and asked bids for the Tenth street bridge over the canal, and the New York street bridge over Pogue's Run.

JOLIET, ILL.—Will County will build a number of bridges this summer. One in Custer County will cross Ferriss Creek; another will be on Peotone highway over Rock Creek, and another will be in Wilton, between Wallingford and Wilton, and cost $1,800.

LAWRENCEBURG, TENN.—Lawrence County, according to report, will build a large steel highway bridge near this place. F. M. Cannon is chairman of the committee.

LITTLE CURRENT, ONT.—The Manitoulin & North Shore Ry., mentioned under Railroad Construction, will build a swing bridge at Little Current, on Manitoulin Island over North Cannel. Address Hearst & McKay, Sault Ste. Marie, Ont.

LOUISIANA.—The Texas & Pacific has let a contract to the Missouri Valley Bridge & Iron Works for a steel bridge 700 ft. long over Red River at Turnbull's Island, La., at $260,000. The bridge company has also a contract from the railroad for a steel bridge 490 ft. long over Bayou-Pierre at Natchitoches Parish, La., at $31,000.

MARIANNA, ARK.—The Lee County Court will receive bids, on July 1, for a 150-ft. bridge over Lariquille River near this place. W. T. Danick, County Judge.

MCCONNELLSVILLE, OHIO.—Bids are wanted, July 5, according to report, for rebuilding three spans and the draw of the bridge over the Muskingum River. F. E. Whipple, County Auditor.

MEMPHIS, TENN.—General Manager Harding, of the Missouri Pacific, is reported as saying that the Gould Lines will build a second bridge over the Mississippi River from Memphis to the Arkansas shore. The present bridge is owned by the Kansas City & Missouri Railway & Bridge Co., which is leased to the Kansas City, Fort Scott & Memphis.

MONTREAL, QUE.—The Dominion Bridge Co. has the contract for Bout De L'Isle Bridge for the Chateauguay & Northern Ry., at $250,000; also for the other bridges on the road.

MOUNTAIN HOME, IDAHO.—The Clerk of the Board of County Commissioners will advertise for bids during July for a steel bridge about 180 ft. long over the South Fork of Boise River, located 50 miles north of the Oregon Short Line R. R. A. G. Smith, County Clerk.

NEWBURYPORT, MASS.—The Legislature has appropriated $25,000 toward building a bridge over the Merrimac River to Salisbury. It will be a steel bridge about 2,500 ft. long and cost between $150,000 and $200,000. The County of Sussex, the Haverhill & Amesbury Street Ry., and the two cities, will pay part of the cost.

NEW PROVIDENCE, N. J.—We are told that John F. Wahl will soon receive bids for a steel bridge over Passaic River on South street, at a cost of about $3,200.

NEW WHATCOM, WASH.—J. J. Donovan, General Superintendent of the Bellingham Bay & Eastern R. R., wants bids, until July 15, for a wooden trestle 3,500 ft. long over Lake Whatcom, and estimated to cost $10,000. He opened bids on June 26 for a trestle 3,000 ft. long over Bellingham Bay at Fairhaven.

NEW YORK, N. Y.—Bids opened by the Department of Bridges, on June 20, for building the piers of the Blackwell's Island bridge, known as bridge No. 4, were as follows: John C. Rodgers, $795,000; Ryan & Parker, $745,547; Norton & Kirk, $928,797; Williams & Gerstle, $1,025,337; M. J. Dady, $877,900; United Engineering & Construction Co., $956,870; John Pierce, $999,900; E. C. Gildersleeve, $867,000; Coleman, Bornsheit & Coleman, $1,400,000, and Liebmann & Gahagan, $895,000.

The War Department has approved the plans for a bascule bridge over Newtown Creek at Vernon avenue, Queens Borough. The appropriation is $644,495. John L. Shea, Bridge Commissioner.

NORTHFIELD, MASS.—The Legislature has passed a bill for a bridge over the Connecticut River to Greenfield. The cost will be about $35,000.

OAKVALE, VA.—We are told that the Norfolk & Western will open bids this week for bridges needed for a second track between Oakvale and Tulip, and between Webster and Vinton.

OGLETHORPE, GA.—The Clerk of the County Commissioners will open bids, on July 23, for a steel bridge with wooden approaches over Flint River, near this place. The steel structure will be 270 ft. long and the approaches 700 ft. The estimated cost is $8,000. A. H. Perry, Clerk.

OMAHA, ILL.—John Wilson, at Omaha, Ill., will receive bids, until July 10, for a steel bridge over Cane Creek.

OSCEOLA, NEB.—W. O. Johnson, County Clerk, will receive bids, on July 1, for rebuilding about 1,400 lineal ft. of the south end of the bridge over Platte River at Silver Creek.

Mr. Johnson will receive bids, on July 15, for building a number of wooden bridges, the most important of which is across the south channel of the Platte River between Polk and Butler counties.

PHILADELPHIA, PA.—We are told that bids are wanted, July 2, by the Department of Public Works, for a steel bridge on Dauphin street under the eight tracks of the Connecting Ry. The span will be 76 ft. and the masonry ashlar and rubble. The approximate cost is $40,000.

Bids will also be wanted, by the Director, on July 2, for three bridges, on Chew street, High street and Washington Lane, under the Chestnut Hill branch of the P. & R. Ry. They will be steel structures with ashlar masonry. The High street bridge will be 64-ft. span, Washington Lane about 54 ft., and the Chew street bridge about 146 ft. The aprpopriation by the city is $70,000; the railroad will pay the balance.

The Secretary of War has approved the plans of the Pennsylvania R. R. for the two steel bridges over the Schuylkill River. Bids are wanted, by Chief Engineer Brown, until July 5, for the masonry work, consisting of four piers. (See May 31, p. 372.)

PITTSBURGH, PA.—Director of the Department of Public Works, E. M. Bigelow, is advertising for separate bids which will be opened July 6, for building the Lincoln avenue bridge crossing Beechwood avenue; also for building the Oakland bridge from near Wilmot street to Schenley Park. Both bridges are steel and have been mentioned in this column several times.

Bids are wanted, July 1, for the foundations and masonry for the double-track steel cantilever bridge over the Monongahela River for the Pittsburgh, Carnegie & Western. Address Bollar & Hodge, 1 Nassau street, New York. (June 21, p. 446.)

PLEASANT HOPE, MO.—The County Surveyor, at Bolivar, will open bids, on July 8, for a steel bridge about 146 ft. long, to cross the Pomme de Terre River. G. M. Botts, County Surveyor.

REDDING, CAL.—Bids will be received, until July 10, for a Howe truss bridge over Squaw Creek. W. O. Blodgett, County Clerk.

RENSSELAER, N. Y.—The New York Central and the Boston & Albany railroads, according to local reports, will build a bridge over Island Creek.

SAVANNAH, GA.—We are told that bids will soon be wanted by T. S. Tutwiler, Chief Engineer of the Plant System, for a 250-ft. bridge over the Big Satilla River; also for a 125-ft. steel bridge over Little Satilla River. The approximate cost of both structures is $35,000.

ST. BONIFACE, MAN.—Notice has been given in city council of a by-law to provide for a new bridge across the Red River between this town and Winnipeg. The Canadian Northern Ry. has offered to build the approaches and subway.

ST. JOSEPH, MO.—The Indiana, Illinois & Iowa has given the contract to the American Bridge Co. for its 150-ft. steel bridge over the St. Joseph River between St. Joseph and Benton Harbor.

ST. LOUIS, MO.—We are told that bids are wanted, at once, for two steel bridges on the Southern Missouri R. R. (Illinois Southern), by Robert Moore, St. Louis, Mo. One bridge will be at Missouri Junction, Ill., over Kaskaskia River and be 520 ft. long and cost $50,000. The other is a viaduct near St. Genevieve, Mo., and will be 800 ft. long, costing about $50,000.

SEDAN, KAN.—Contracts will be let, July 3, by the County Commissioners, for two steel bridges, one a high truss of 80 ft., the other a low truss of 66 ft.

SPRINGFIELD, MASS.—C. M. Slocum, City Engineer, tells us that nothing is decided regarding the bridge proposed over the Connecticut River at Worthington street. The Commissioners who have the matter in hand are expected to report on the site and approaches about July or August.

SPRINGFIELD, MO.—The City Engineer informs us that the bids for the steel bridge on Jefferson street over the St. Louis & San Francisco tracks have been rejected. New bids are wanted, but the date is not yet set. It is to be a cantilever structure of four spans, 40 ft., 91 ft., 175 ft. and 100 ft.

The County Court is considering a site for a bridge at Cow Ford.

SUWANEE SHOALS, FLA.—We are told that bids will probably be received some time between now and the first of the year for a steel bridge over Suwanee River, by the Commissioners of Columbia County. R. T. Busur is Chairman of the Commissioners, Lake City, Fla.

TACOMA, WASH.—The War Department has approved the plans for bridging the Puyallup River at St. Paul street. Address the Board of Public Works.

TRENTON, N. J.—The Secretary of War has approved the plans of the Pennsylvania R. R. for a four-track arched masonry bridge over the Delaware River at Trenton. The Trenton Council must yet take action on the relocation of the tracks through South Trenton for the approach to the bridge.

TOPEKA, KAN.—The Commissioners have decided upon sites for the two remaining bridges to cross Kansas River. One will be between Silver Lake and Valencia, and the other will be at Menoken Township. It is expected that these bridges will be contracted for this season.

The Fort Leavenworth Bridge Co. has been organized with a capital of $100,000, to build a bridge over the Missouri River at the military reservation. John W. Newell and Ernest H. Hogueland, of Topeka, are interested.

VANCOUVER, B. C.—At the last session of the Provincial Legislature $25,000 was voted for rebuilding the bridge across the north arm of the Fraser River. It is proposed to put in steel spans.

VICTORIA, B. C.—The City Council wants information regarding plans and cost of a bridge at Point Ellice. Particulars may be obtained from the City Engineer.

WAREHAM, MASS.—The Harbor and Land Commissioners of Massachusetts have granted licenses for two street railroad bridges to the Middleboro & Wareham & Buzzard's Bay Street Railway. These bridges are authorized in accordance with the bill passed by the general court. One of them is 13 ft. wide and 269 ft. long and is adjacent to the present highway bridge over Swift River at Point Independence in Wareham. The other is 13 ft. wide and 698 ft. long and adjoins the highway bridge over Buttermilk Bay in Wareham and Bourne.

WASHINGTON, D. C.—The plans prepared by the Pennsylvania R. R. for a bridge across the Potomac River to replace the Long bridge, have been passed upon by the Board of Army Engineers, to which they were referred. The Board reports that the bridge proposed meets all requirements as to navigation, and the plans are therefore approved. The plan of a straight bridge crossing the river at right angles with the current and landing further west on the Virginia side than the present bridge is also approved. The report alludes to the extreme simplicity of the proposed bridge and suggests the desirability of a more ornamental structure for that location. The report has been approved by Gen. Gillespie, Chief of Engineers, and referred to Col. Bingham, of the Corps of Engineers for a special report on the Washington approaches to the bridge.

WATSEKA, ILL.—The Supervisors of Iroquois County at the June meeting, appropriated $9,000 for eight bridges in various parts of the county. H. H. Salmon is chairman of the bridge committee.

WALKERVILLE, ONT.—The Chief Engineer of the Lake Erie & Detroit River Ry. informs us that the company proposes to build an arch culvert over Cedar Creek about 27 miles east of Walkerville, this season. It is not decided whether a double arch or a single arch of 35 or 45-ft. span will be built. It is expected that the plans will be ready about July 1.

WEST PALM BEACH, FLA.—The Florida East Coast R. R., we are told, will build a bridge about 2,700 ft. long over Lake Worth at West Palm Beach.

WINDOM, MINN.—Bids are wanted, July 9, according to report, for a steel bridge over the Des Moines River. John A. Brown, County Auditor.

Other Structures.

CONSHOHOCKEN, PA.—The Alen Wood Co., of Philadelphia, is contemplating building an open-hearth steel plant at Conshohocken.

HAVRE, MONT.—The contract for the repair shops, a roundhouse and blacksmith shops for the Great Northern at Havre has been awarded to Smith Bros., of West Superior, Wis. It is estimated that the buildings will cost about $62,000, without equipment. A contract has been let to a St. Paul firm for a new roundhouse at Kalispell. A new station will be built at Havre.

ROSEDALE, KAN.—The Kansas City, Fort Scott & Memphis road has prepared plans for a grain elevator of 700,000 bushels capacity in Rosedale. The cost of the building will be $200,000. It will be built north of the Memphis tracks and between Mill street and Turkey Creek.

YOUNGSTOWN, OHIO.—A steel forging plant is in contemplation at Youngstown, by Henry Wick, of Youngstown; Julian Kennedy, of Pittsburgh, and F. H. Buhl, of Sharon, Pa.

The Youngstown Iron, Sheet & Tube Co. will increase its capital from $1,000,000 to $2,000,000, and will build two blast furnaces.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad associations and engineering societies see advertising page xvii.)

National Association of Railway Agents.

This Association held its fifth annual convention at Pittsburgh June 18. The President for the ensuing year is Mr. W. H. Mills (L. S. & M. S.), Norwalk, Ohio; Secretary, N. A. Cotrell (St. L., I. M. & S.), Bismarck, Mo.

St. Louis Railway Club.

The June meeting has been passed on account of the several conventions in various parts of the country which many of the members will attend. The next meeting will be in September. The Proceedings will be issued regularly as is customary; those for June will have a paper by Mr. Henry Miller, Asst. Superintendent, Burlington Route, entitled "A Study in Locomotive Economy." New questions in the Question Box Department will also appear.

PERSONAL.

(For other personal mention see Elections and Appointments.)

—Mr. W. B. Mulvey, Division Superintendent of the Southern Pacific Company (Atlantic System), with headquarters at Houston, Tex., died June 18, at Luling.

—Mr. T. R. Price, former Chief Traffic Manager of the Cape Government Railways, South Africa, has been appointed General Manager in place of Mr. C. B. Elliott, resigned. Mr. Elliott has been appointed Special Railway Commissioner to investigate and report on American and European methods of railway management. He will soon visit the United States for this purpose.

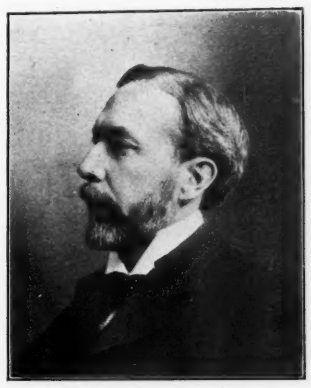
—Mr. A. H. Smith, who, on June 24, was made General Superintendent of the Lake Shore & Michigan Southern has been since April 1 Assistant General Superintendent. Mr. Smith was born in 1863, and entered railroad service as a messenger boy with the same company in 1878. He was employed later as a clerk in the general office, and was transferred to the bridge construction gang as laborer in 1883. He was appointed Foreman of Bridges in 1888. Two years later he became Superintendent of the Kalamazoo Division and from then until 1901 was Superintendent on the Lansing, Franklin and Michigan divisions. It will be seen that Mr. Smith's entire railroad career has been with the "Lake Shore."

—Mr. Ralph Peters, the new General Superintendent of the Pittsburgh, Cincinnati, Chicago & St. Louis, is a native of Georgia, having been born in Atlanta Nov. 19, 1853. He was graduated from the University of Georgia in 1871, and entered railroad service in 1874 as Secretary and Chief Clerk to the General Superintendent of the Pittsburgh, Cincinnati & St. Louis, now a part of the Pittsburgh, Cincinnati, Chicago & St. Louis. He remained in this position until 1881, when he became Superintendent of the Western Division of the Chicago, St. Louis & Pittsburgh. In June the same year (1881) he was appointed Superintendent of the Cincinnati Division of the Pittsburgh, Cincinnati, Chicago & St. Louis, and in 1896 the additional duties of General Agent at Cincinnati were added, and later he was also made Superintendent of the Cincinnati, Lebanon & Northern.

—Mr. William C. Downing was born Aug. 21, 1865, at Richmond, Ind. He entered railroad service at the age of 20 as a rodman in the engineer corps on the Eastern Division of the Chicago, St. Louis & Pittsburgh. The following year (1886) he was advanced to the position of Acting Assistant Engineer. Then in 1887 he was appointed Inspector of Masonry, and in 1888 Assistant Engineer of the same division, which, after the consolidation of the lines in the Southwest System of the Pennsylvania Lines, was known as the Indianapolis Division. Mr. Downing was promoted to the position of Engineer of Maintenance of Way of the Richmond Division of the Pennsylvania Lines in 1891, and four years later became Engineer of Maintenance of Way of the Main Line Division of the Terre Haute & Indianapolis. Mr. Downing assumed his new duties as Superintendent of the Peoria Division of the Vandalia Line on June 10.

—Mr. Benjamin McKeen, Superintendent of the Main Line Division of the Terre Haute & Indianapolis, was born Jan. 23, 1864, at Terre Haute, Ind. He attended the Worcester Polytechnic Institute, remaining there a year and a half; after which time he returned to Terre Haute, and entered the Rose Polytechnic Institute, and was graduated in 1885. His first railroad experience was as a draughtsman in the office of the Superintendent of Motive Power of the Vandalia Line. Later he became a rodman, and in 1886 was made Resident Engineer. On Jan. 1, 1887, he was appointed Engineer of Maintenance of Way of the Logansport Division of the Terre Haute & Indianapolis, and in the latter part of 1889 was appointed Chief Engineer of Construction in completing the Indiana & Lake Michigan Railroad, which extended from South Bend, Ind., to St. Joseph, Mich. This was in addition to his duties as Engineer of Maintenance of Way, and on the completion of this extension, in 1890, Mr. McKeen's jurisdiction was extended over that division. Mr. McKeen was elected a member of the American Society of Civil Engineers in 1895.

—Mr. F. A. Delano has been appointed General Manager of the Chicago, Burlington & Quincy, to succeed Mr. Brown, who goes to the Lake Shore & Michigan Southern as Vice-President and General Manager of that road. Mr. Delano is a young man for a position so important, having been born Sept. 10, 1863, at Hong Kong, China. He was graduated from Harvard University, and entered railroad service in 1885. He has been continuously with the Chicago, Burlington & Quincy since that date, in the engineering and operating department. He entered the shops as machinist's apprentice. He eventually became Superintendent of Freight Terminals at Chicago, and in the beginning of 1899 was made Superintendent of Motive Power. Mr. Delano has been uncommonly active as a student, speaker and writer as well as in administrative work. A number of years ago he attracted attention to himself by his valuable studies of the metallurgy of rails, and since that time he has contributed frequently to the discussion of technical questions in the mechanical associations, the Western Railway Club, and in contributions to the *Railroad Gazette*. For some years we have looked upon him as an example of the best type of those highly trained professional men who are so rapidly coming forward in the arduous profession of railroading.



—Mr. John William Kendrick became Third Vice-President of the Atchison, Topeka & Santa Fe Railway on June 5, leaving the office of Second Vice-President and General Manager of the Northern Pacific. Those who know the history of the Northern Pacific and are familiar with Mr. Kendrick's work there must regret that he has decided to make this change, but he does not leave the railroad profession. Mr. Kendrick was born Oct. 14, 1853, at Worcester, Mass., and was graduated from the Worcester Polytechnic Institute with the class of 1873. He entered railroad service in 1879 with a construction party of the Northern Pacific Railroad in the Yellowstone Valley, and from that year until going to the Atchison, Topeka & Santa Fe he has served with the Northern Pacific and its allied lines. For four years he was on surveys and construction, then for five years he was Chief Engineer of the St. Paul & Northern Pacific Railroad in charge of the main line and terminals between Brainerd and St. Paul; then to 1893 he was Chief Engineer of the Northern Pacific, and in a year he became General Manager. Feb. 1, 1899, he became Second Vice-President. We have from time to time mentioned in more or less detail the important work done by two engineers, Mr. Kendrick and Mr. McHenry, in reconstructing the road and equipment of the Northern Pacific, and we hope some time to be able to give an adequate account of this work. Now we can only say that it has been one of the most remarkable of the many works of rehabilitation that have been performed on the railroads of the country in the last few years. It would be quite impossible for us to attempt to separate the work and influence of Mr. Kendrick from that of Mr. McHenry, but it is not at all an exaggeration to say that to those two gentlemen more than to anybody else is due the present efficiency of the Northern Pacific properties.

ELECTIONS AND APPOINTMENTS.

Atchison, Topeka & Santa Fe.—Milton Player has been appointed Division Master Mechanic, with headquarters at Topeka, Kan., succeeding G. T. Neubert.

Baltimore & Ohio.—D. C. Green has been elected Assistant Secretary, with headquarters at Philadelphia, Pa., and W. H. Williams, Assistant Secretary at Baltimore, Md.

Bessemer & Lake Erie.—We are informed that there is no foundation for the report, made by a contemporary, that J. S. Matson, Superintendent of this company, had resigned to become Assistant to the President of the Duluth & Iron Range.

Blackwell, Enid & Southwestern.—Linton Williams has been appointed General Superintendent, with headquarters at Blackwell, Okla. T., effective July 1. J. F. Sechler becomes Master Mechanic and Ed L. Peckham Purchasing Agent, effective June 15. A. G. C. Bierer was, on June 15, appointed General Attorney, with headquarters at Guthrie, Okla. T. Mr. Sechler and Mr. Peckham will also assume the same duties on the Blackwell, Enid & Texas. L. D. Button has been appointed General Superintendent of the B., E. & T., with headquarters at Vernon, Texas, effective July 1.

Canadian Northern.—C. E. Friend has been appointed Acting Auditor, with headquarters at Winnipeg, and C. Raitt Acting Master Mechanic. Mr. Raitt succeeds J. T. Lord, resigned to accept service with another company.

Canadian Pacific.—R. Peard has been appointed Assistant Superintendent of the Western Division, with headquarters at Winnipeg, Man.

Chicago, Burlington & Quincy.—F. A. Delano has been appointed General Manager, succeeding W. C. Brown, resigned. J. F. Deems, heretofore Assistant Superintendent of Motive Power, has been appointed Superintendent of Motive Power, succeeding Mr. Delano. It is understood that J. A. Carney will succeed Mr. Deems.

Chicago Terminal Transfer.—R. C. Bogart has been appointed Secretary and Assistant Treasurer, succeeding G. P. Butler.

Cleveland, Cincinnati, Chicago & St. Louis.—J. Egan, Superintendent of Dining Car Service, with headquarters at Cincinnati, Ohio, has resigned.

Cumberland Valley & Waynesboro (Mont Alto).—The officers of this company are: President, M. C. Kennedy; Secretary, W. L. Ritchey, and Treasurer, W. M. Biddle.

Detroit Southern.—T. M. Downing has been appointed Superintendent of Motive Power and Equipment.

The Directors of this company are: John E. Borne, Cyrus J. Lawrence, Evans R. Dick, Leopold Wallach, Simon Borg, Charles Parsons, F. J. Lisman, Don M. Dickinson, William McMillan, Henry B. Joy, Myron T. Herrick, Samuel Hunt and A. B. Voorheis.

Erie.—D. W. Cooke has been appointed General Passenger Agent, with headquarters at 21 Cortlandt street, New York City, succeeding D. I. Roberts, resigned, effective July 1. (See page 389.)

Grand Trunk.—The jurisdiction of C. H. Bevington, Trainmaster, has been extended to cover the territory of which W. G. Brownlee had charge as Assistant Superintendent. Mr. Bevington's headquarters will be Montreal, Que.

Greenwich & Johnsonville.—The following new officers have been elected: President, I. C. Blandy, Greenwich, N. Y.; Vice-President, G. F. Blandy, New York; Secretary, D. A. Bullard, Schuylerville, N. Y., and Treasurer, C. P. Noyes, New York.

Gulf, Colorado & Santa Fe.—James Lauder has been appointed Acting Division Master Mechanic, with headquarters at Cleburne, Texas, succeeding L. H. Waugh, Division Master Mechanic, resigned.

Hawkinsville & Florida Southern.—H. H. Steele has been appointed General Freight and Passenger Agent, with headquarters at Hawkinsville, Ga.

Lake Shore & Michigan Southern.—At a meeting recently held W. H. Newman was re-elected President and W. C. Brown, heretofore General Manager of the Chicago, Burlington & Quincy, was appointed Vice-President and General Manager.

Norfolk & Western.—V. A. Riton has been appointed Superintendent of the Pocahontas Division, with headquarters at Bluefield, W. Va., succeeding N. D. Maher, and Mr. Riton, in turn, is succeeded by J. B. Conners as Superintendent of the Scioto Division, with headquarters at Portsmouth, Ohio. E. L. DuBarry, heretofore Superintendent of the Norfolk Division, has succeeded Mr. Conners as Superintendent of Terminals, with headquarters at Norfolk, Va. T. Low succeeds Mr. DuBarry at Crewe, Va., and Mr. Low is succeeded by A. C. Needles as Superintendent of the Shenandoah Division, with headquarters at Roanoke, Va.

Northern Pacific.—The headquarters of G. W. Vanderslice, Division Superintendent, have been removed from Winnipeg, Man., to East Grand Forks, Minn.

Seaboard Air Line.—At a meeting of the Board of Directors, held on June 21, J. Wm. Middendorf, of the banking firm of J. Wm. Middendorf & Co., Baltimore, was elected Third Vice-President of the S. A. L. At the same meeting V. E. McBee, heretofore General Superintendent, was elected Fourth Vice-President. Mr. McBee has been succeeded as General Superintendent by Nicholas D. Maher, heretofore Division Superintendent of the Norfolk & Western.

Southern Pacific.—H. A. Jones, heretofore General Freight Agent of the Texas & New Orleans, has been appointed Acting Traffic Manager of the S. P. (Atlantic System), succeeding C. W. Bein, deceased, the former Traffic Manager.

Tennessee Coal, Iron & Railroad.—Many of the duties that have been attended to by G. B. McCormack as General Manager, will be assumed by Charles McCrery, probably about Sept. 1.

Toledo, St. Louis & Western.—J. D. Brennan, heretofore Trainmaster of the Lake Shore & Michigan Southern, has been appointed Superintendent of the T., St. L. & W.

Union Pacific.—J. C. Stubbs, Third Vice-President of the Southern Pacific, has been appointed Traffic Manager of the Western trunk lines controlled by the Harriman syndicate. Mr. Stubbs' headquarters will be at Chicago.

Wabash.—At a meeting held recently O. D. Ashley was elected Chairman of the Board and J. Ramsey, Jr., succeeded Mr. Ashley as President.

Wisconsin Central.—A. R. Kipp succeeds C. W. Tait, General Foreman, with the title of Master Mechanic.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

BALLSTON TERMINAL ELECTRIC.—Rights of way are being obtained for the extension from Ballston, N. Y., to Galway and Amsterdam, 20 miles. Surveys are also in progress. (May 31, p. 373.)

BALTIMORE, WESTMINSTER & GETTYSBURG (ELECTRIC).—I. A. Sweigard, President, and T. F. Durham, Secretary, both of Philadelphia, have filed a declaration in the recorder's office, at York, Pa., of a proposed loop of 20 miles to connect Littlestown, Hanover, New Oxford and East Berlin. (June 21, p. 447.)

BIRMINGHAM, SELMA & NEW ORLEANS.—The contract for the extension, noted last week, is from Thomaston, Ala., east, and has been let to J. J. King and Thomas Sullivan, both of Selma. (June 21, p. 447.)

CALIFORNIA ROADS.—The Eldorado Lumber Co., which owns a sawmill at Folsom, is reported building a logging road on the south side of the South Fork in the direction of Placerville, which is to be completed within 90 days.

CANASTOTA & MORRISVILLE (ELECTRIC).—This company has been incorporated in New York, with a capital stock of $200,000, by residents of Madison County, to build a line 15 miles long in that county.

CAPE BRETON RAILWAY EXTENSION.—A meeting of the stockholders has been called at the company's office in Montreal, July 17, to authorize the issue of $2,400,000 5 per cent. gold bonds secured by a first mortgage, for this proposed line on the island of Cape Breton. John M. Guerin is Secretary. (June 21, p. 447.)

CARLISLE & MOUNT HOLLY TROLLEY (ELECTRIC).—This company has been organized at Carlisle, Pa., to connect that city with Hagerstown, Md.

CENTRAL NEW ENGLAND.—Surveys are reported under way around the Montague farm to make the connecting line between the two sections of this road from Tariffville, Conn., to Springfield, Mass. (May 31, p. 373.)

CHATEAUGUAY & NORTHERN.—Smith & Abbott, of New York City, are reported to have the contract for the line from Charlemange, L'Assomption County, to Joliette, Que. J. P. Mullarky, of Montreal, is Managing Director. The Dominion Bridge Co. builds the bridges. (June 14, p. 421.)

CHICAGO & NORTHWESTERN.—Contracts are reported being obtained for this proposed extension from Moville, Iowa, west about 20 miles to Sioux City. (Construction Supplement, March 8, 1901.)

CHICAGO, KENOSHA & MILWAUKEE ELECTRIC.—This company was incorporated in Wisconsin, June 18, to build a line from Chicago north to Milwaukee. It is proposed to carry both freight and passengers, and the Northwestern Elevated is said to be behind the new company.

CHOCTAW, OKLAHOMA & GULF.—An officer writes that the company has no knowledge of any contemplated line from Little Rock, Ark., to Malvern. (June 7, p. 389.)
See also Choctaw, Oklahoma & Texas.

CHOCTAW, OKLAHOMA & TEXAS.—This company has been incorporated in Texas, with a capital stock of $1,680,000, to build the Choctaw, Oklahoma & Gulf extension from Weatherford, Okla., west to Amarillo, Texas. All the contracts for the Texas line will be let within the next 20 days.

The stockmen south of Amarillo have made a proposition to build a line from Amarillo south about 80 miles to Plainview.

DOYLESTOWN & EASTERN (ELECTRIC).—The Commissioners of Northampton County, Pa., have granted this company permission to build along the Delaware River between Easton and the Bucks County line. The road must be completed before Dec. 1, and in operation before July 1, 1902. It is projected to connect the towns named, about 31 miles. I. R. Rosenberger, of Colmar, Pa., is President. (Construction Supplement, March 8, 1901.)

EL PASO & NORTHEASTERN.—Surveys are reported in progress for an extension from Santa Rosa, N. Mex., north 129 miles to the Dawson-Maxwell coal fields.

FREDERICKSBURG & RAPPAHANNOCK.—The Eastern Virginia Construction Co. has been formed to build this proposed line from Fredericksburg, Va., through Culpeper and Sperryville to Washington, Va., about 55 miles. A. G. Willis, of Culpeper, is President of the construction company.

IDAHO MIDLAND.—Concessions are being asked in the city of Boise, Idaho, for this proposed line from that city east and northeast via Pine Grove, thence over the Divide and down Salmon River to Gibsonville and thence to Butte, Mont., 364 miles. Thomas W. Bates, of Boise, Idaho, is President. (Construction Supplement, March 8, 1901.)

INDIANAPOLIS, PLAINFIELD & WESTERN TRACTION (ELECTRIC).—This company was incorporated in Indiana, June 18, with a capital stock of $200,000, to build a line from Indianapolis to Plainfield. The incorporators are: George J. Munroe, Chicago; Benjamin F. Nysewander, George E. Reynolds and Frank M. Smalley, Indianapolis, and Addison Ballard, Plainfield.

KENTUCKY ROADS.—Right of way is reported secured for a mineral railroad from Carrsville, on the Ohio River, southeast about 30 miles to Cuttawa, on the Illinois Central.

LIMA, DELPHOS, VAN WERT & FORT WAYNE TRACTION (ELECTRIC).—This company, incorrectly entered as the Delphos, Van Wert & Fort Wayne Electric (June 7, p. 389), was incorporated in Ohio May 24, with a capital stock of $50,000, to build from Lima northwest to a point on the Indiana State line in Tulley Township, Van Wert County, and thence to Fort Wayne, Ind. The general office is Lima. The incorporators are: D. J. Cable, J. B. Kerr, Wm. F. Unman, H. W. Neff and W. S. Parmenter, all of Lima.

LONG ISLAND EXTENSION.—This company was incorporated in New York, June 18, with a capital stock of $1,000,000, by officers of the Pennsylvania and Long Island, to build an underground electric connecting the Long Island R. R. in Long Island City with Manhattan. It is a tunnel line starting from Thompson avenue, L. I., at grade and running under the tracks of the Long Island and the Bordern avenue station and thence under the East River to Thirty-third street; thence along Thirty-third street to Seventh avenue; thence north along Seventh avenue to Forty-fifth street, about four miles. The tunnel is to pass under the Rapid Transit Line at Park avenue, at which point there will probably be a station. Another probable station is at Herald Square, and another on Seventh avenue and Thirty-third street. The plans seem to provide for coming up to the grade of the Rapid Transit tunnel on Seventh avenue in the vicinity of Forty-fifth street. The company will make application to the State Railroad Commission and later will get its plans before the Rapid Transit Commission and the New York Municipal Assembly. At the first meeting of the company, on June 21, Samuel Rea, Fourth Vice-President of the Pennsylvania, was made President, and F. E. Haff, Secretary of the Long Island R. R., Secretary and Treasurer.

LOUISVILLE & NASHVILLE.—The Worthington Construction Co. has been incorporated, with a capital stock of $20,000, to take the contract for the extension from Geneva, Ala., to Graceville, Fla., 23 miles. (May 31, p. 374.)

MAHONING RAILWAY & IMPROVEMENT.—This company has been organized to build a line from Ives Landing, Wash., on the Columbia River, at the mouth of the Methow River, to run northwest up the Methow to Robinson Creek, with a branch of 35 miles from the mouth of the Twisp River and west up that river. It is stated that all the preliminary work is to be done this year and the building begun early in 1902. Surveys are in progress. W. H. Plummer, of Spokane, is President.

MANITOWOC & NORTHERN TRACTION (ELECTRIC).—This company has been incorporated in Wisconsin, with a capital stock of $100,000, to build a railroad connecting Manitowoc with neighboring cities. The incorporators are: Thomas Higgins, Neenah; H. C. Higgins, Marinette, and State Senator H. I. Weed, Oshkosh.

MARYLAND ROADS.—The Rockdale Powder Company is reported preparing to build a standard gage branch to the Western Maryland near Alesia.

MISSOURI PACIFIC.—An officer of the Sedalia, Warsaw & Southwestern writes that the company expects to change the gage some time this year or early next year, but no time is definitely fixed. (June 7, p. 389.)

NEW YORK & PORT CHESTER (ELECTRIC).—Application has been made to the New York Railroad Commission for right of way for this proposed line from the Harlem River to Port Morris, northeast 25 miles through Mount Vernon, Pelham Manor, New Rochelle, Larchmont, Mamaroneck, Milton, Rye and Port Chester to the Connecticut line, with a branch to Clasen's Point on the East River. Among those interested are Charles Heinecke, of Whitestone; M. F. Germond, of Dumont, N. J., and Ernest Muller, of Westfield, N. J. (April 12, p. 259.)

NORFOLK & WESTERN.—An officer writes that contracts have been let for second track grading between Oakdale and Tulip, Va., 10 miles, and between Webster and Vinton, six miles. (June 7, p. 390.)

NORTHERN PACIFIC.—The company is reported obtaining right of way for the proposed extension from Scappoose, Ore., west 21 miles to Pittsburgh. (May 3, p. 308.)

NORTH GEORGIA ELECTRIC.—This company has nearly completed locating this line and has obtained most of the right of way from Gainesville, Ga., to Dahlonega. Part of the grading also is completed. A. J. Warner, of Dahlonega, is President; J. F. Moore, Dahlonega, Secretary and Treasurer, and W. A. Carlisle, Gainesville, Engineer. (Georgia Roads, June 7, p. 389.)

OREGON RAILROAD & COAL.—This company has been organized in Oregon, with a capital stock of $500,000, to build a railroad from Heppner, on the Oregon Railroad & Navigation, to run south 25 miles to coal mines. W. S. Lytle, of Heppner, for some years connected with the Northern Pacific Coal Co., at Roslyn, Wash., and later with the Columbia Southern, is President and chief promoter.

OREGON SHORT LINE.—An officer writes that surveys are in progress for a line from a point near Garfield Beach, Utah, to run south via Tooele and Silver City to a point on the company's line about 1½ miles south of Leamington. The survey is to determine the feasibility of building.

PACHUCA, ZACUALTIPAN & TAMPICO.—A. E. Stilwell, of Kansas City, and associates, who have recently bought this line (June 14, p. 422), have been granted an amended concession by the Mexican Government for extending the road from its present terminus at Sandoval into the City of Mexico, and from Apulco, the northern terminus, to the Port of Tampico. The concession carries a subsidy of $6,500 for each kilometer built and approved by the Government, payable in 5 per cent. bonds of the interior and the redeemable debt of the republic. The line will be standard gage and the entire length between the City of Mexico and Tamipco will be about 460 k.m. (286 miles).

PENNSYLVANIA ROADS (ELECTRIC).—The Pennsylvania Legislature has passed two supplemental bills to the Emery and Focht bills, whereby the Governor, Secretary of State and Attorney General are constituted a board to pass on applications for Rapid Transit franchises. Mr. Wanamaker has renewed his offer to pay the city $2,500,000 for the 13 franchises covering 120 miles of street, recently granted, and in addition, will pay the present grantees $500,000 for their rights. He also offers to arrange for 3-cent fares during the rush hours of the day. (June 21, p. 448.)

PERE MARQUETTE.—The Coloma & Paw Paw Lake, now owned by private individuals and operated by the Pere Marquette, is to be extended to Covert, Van Buren County, Mich. It will be run in connection of the South Haven division of the Milwaukee, Benton Harbor & Columbus.

PITTSBURGH & CASTLE SHANNON.—This line, extending from Pittsburgh, Pa., to Castle Shannon and Arlington, is to be practically rebuilt, according to report, and extended on via Finleyville to Brownsville.

PLANT SYSTEM.—Application has been made for amendment to the charter of the Savannah, Florida & Western, for building the cut-off 54 miles long from Jesup, Ga., to Folkston, reducing the distance between Savannah and Jacksonville. (May 31, p. 374.)

ROSENBERG, DAMON MOUND & GULF.—This company, organized some years ago, is reported preparing to begin grading by July 1. S. C. Brasher, of Houston, Texas, has been made President; L. H. Ayler, of Orchard, Vice-President, and R. T. Mulcahy, of Rosenberg, Vice-President.

RUMFORD FALLS & RANGELEY LAKES.—The Maine State Railroad Commissioners have approved the extension from Bemis north to Mountain View, nine miles. (June 14, p. 422.)

SPRINGFIELD, JEFFERSON CITY & CHICAGO.—The stockholders have increased the capital stock from $2,750,000 to $3,500,000. The road is projected from Springfield, Mo., to Jefferson City, 121 miles. Wm. Woodburn, Des Moines, Iowa, is President. (June 21, p. 448.)

TIFFIN & PORT CLINTON (ELECTRIC).—This company has been incorporated in Ohio, to build a line from Tiffin northeast via Fremont, Sandusky and Port Clinton to Marblehead. The incorporators are: William P. Dose, H. C. Deran, R. G. Kerlin, E. H. Simon and J. C. Brewer.

TILSONBURG, LAKE ERIE & PACIFIC.—A meeting of the stockholders is called for July 9, at the company's office in Tilsonburg, Ont., to authorize the building of an extension north to Ingersoll, Ont., and to borrow money for the purpose; also to sanction an increase of the capital stock. (Construction Supplement, March 8, 1901.)

TRINITY.—Articles of incorporation have been filed in Shasta County, Cal., for this company to build a line for the Trinity Copper Company from its mines in the Flat Creek District to the Southern Pacific at either Copley, 11 miles, or Kennet, six miles.

WATERLOO & CEDAR FALLS RAPID TRANSIT.—This company is building a line from Waterloo, Iowa, to Denver, 13 miles, which is to be operated by electricity for passengers, and by steam for freight. L. S. Cass, of Waterloo, Iowa, is President and General Manager.

WAYCROSS AIR LINE.—An officer writes that the route is being located for the extension of 36 miles from Fitzgerald, Ga., to Cordele. The maximum grades are 1 per cent., and the maximum curves 3 deg. The rail has been ordered. There will be no steel bridges. All the contracts are yet to be let. (July 7, p. 390.)

WHEELING & LAKE ERIE.—J. W. Patterson, Chief Engineer, is asking for bids up to 2 p. m., July 8, for the line from Pittsburgh, Pa., to a point west of Bridgeville, about 10 miles. All plans and specifications are at the company's office. (June 21, p. 448.)

RAILROAD NEWS.

CATAWASSA.—The Philadelphia Stock Exchange has listed $2,215,000 first mortgage consolidated 4s, due April 1, 1948. Of this amount $210,000 is reserved to take up $14,500 bonds maturing Aug. 1, 1900, and $195,500 bonds maturing Aug. 1, 1902. (July 27, 1900, p. 518.)

CHESAPEAKE TRANSIT.—This company has made a mortgage to the Land Title & Trust Co., at Philadelphia, as trustee, to secure $500,000 of 50-year 5 per cent. gold bonds, for the proposed line from Norfolk, Va., to the light house at Cape Henry, 16 miles. (June 21, p. 447.)

CHICAGO, BURLINGTON & QUINCY.—Burlington & Missouri non-exempt 6 per cent. consolidated mortgage bonds of 1878, to the par value of $152,600, and Republican Valley 6 per cent. bonds of July 1, 1879, to the par value of $21,800, have been called for redemption at the New England Trust Co., Boston, July 1, interest ceasing from that date.

FORT PLAIN & RICHFIELD SPRINGS.—This company, which has been making attempts for some years to build a line connecting the cities named in New York, was placed under Chas. Seidler, of New York, Receiver, on June 15, by Justice Hiscock, upon application of the Farmers' Loan & Trust Co.

FORT WORTH & RIO GRANDE.—The shareholders, on June 13, voted to increase the capital stock to $6,250,000, for the extension from Brownwood, Texas, to San Antonio and the Mexican border.

GULF & INTERSTATE.—Joseph P. O'Donnell, on June 13, was appointed Receiver by Judge Franklin in the Fifty-sixth District Court in Texas, to succeed H. S. Spangler, resigned.

HARTFORD & SPRINGFIELD STREET (ELECTRIC).—The stockholders of the East Windsor Electric have voted to sell their interest to the Enfield & Long Meadow Electric which is to become the Hartford & Springfield Street. (June 14, p. 422.)

KANSAS CITY, FORT SCOTT & MEMPHIS.—This company was incorporated in Kansas City on June 14, with a capital stock of $20,000,000, of which $15,000,000 is 4 per cent. non-cumulative preferred. The company is successor to the old company. The entire capital stock is to be owned by the St. Louis & San Francisco. (May 24, p. 358.)

MISSOURI PACIFIC.—A special meeting of the stockholders has been called for June 26, to authorize the increase of the capital stock by $30,000,000. It is proposed to issue the stock to stockholders at par to the extent of 15 per cent. of their holdings, on July 5, the right to subscribe continuing until 3 p. m., July 18. Payments proposed are 25 per cent. at the time of subscription and 75 per cent. on or before Aug. 1. Scrip certificates will be issued for full subscription payments of less than $100. (June 21, p. 448.)

MONTEREY & MEXICAN GULF.—This line, extending from General Trevino, Mexico, to Tampico, 389 miles, is to be sold to the Mexican Central, whose directors have approved. The sale was negotiated under J. & W. Seligman, New York.

OHIO SOUTHERN.—The Continental Trust Co. gives notice that holders of second mortgage bonds and of certificates of the Manhattan Trust Co., issued on deposit of second mortgage bonds and stock, are offered participation in the plan of purchase of the properties of the Detroit Southern, if availed of before July 1. The bonds must have the coupons of Nov. 1, 1895, and since, attached. The road is to be taken over under the title of the Detroit Southern.

PENNSYLVANIA.—The deliveries of certificates of new stock under the allotment of March, 1901, will be made upon the presentation of countersigned Treasurer's receipts as follows: Receipts dated June 8, or prior thereto, to be surrendered between July 1 and July 10, certificates being delivered on and after July 10. Receipts dated from June 10 to 13 inclusive, to be surrendered between July 10 and 20, certificates to be delivered on and after July 20. Receipts dated June 14 or 15, to be surrendered between July 20 and 30, certificates to be delivered on and after July 31.

ROME, WATERTOWN & OGDENSBURG.—The $500,000 Syracuse Northern first mortgage 7s, due July 1, will be met by an additional $500,000 of R., W. & O. consolidated bonds, bearing interest at 3½ per cent.

SIOUX CITY & PACIFIC.—The Government, on June 20, sold its claim to this property to the Chicago & Northwestern, for $1,872,000, the upset price. The road has been operated by the Northwestern for some time. This price does not cover the entire claim of the Government, which is $1,628,320 principal, and $2,556,269 interest. (April 19, p. 276.)

ST. CLAIR, MADISON & ST. LOUIS BELT.—The officers of this company resumed control of the property at midnight June 15. The road had been in the hands of receiver since Jan. 15, 1897. (June 7, p. 390.)

ST. LOUIS & SAN FRANCISCO.—Notice is given that on July 1, the company having paid for two consecutive years the 4 per cent. cash dividend on its first preferred stock, the voting trustees will, in accordance with the terms of the voting trust agreement, upon surrender of any stock trust certificates then outstanding, make delivery of the proper certificates for the company's capital stock. The exchange may be made at the Continental Trust Co., New York, to June 30.

All voting trust certificate holders of record June 30 will be entitled to subscribe to the amount of 42½ per cent. of their holdings to the cash fund, receiving for each $42.50 so paid $25 in a 4 per cent. gold refunding mortgage bond, due 1936, of the Kansas City, Fort Scott & Memphis (new company), and $29 in 4 per cent. preferred stock trust certificates of the same company. The bonds will be guaranteed, principal and interest, and the preferred stock trust certificates will be guaranteed 4 per cent. dividends by the St. Louis & San Francisco. The first dividends will be payable Jan. 1, 1902. The St. Louis & San Francisco has the right to retire the preferred stock at any time at par, and is obligated to do so in 20 years. Instalments on these rights will be payable, $12.50 Aug. 1, $15 Aug. 20, and $15 Sept. 10. The right to subscribe will expire Aug. 1.

SYLVANIA.—At Sandersville, Ga., on June 18, Wm. N. Hobby, of Sylvania, was appointed temporary receiver of this line upon application of the Central of Georgia. The road extends from Sylvania to Rocky Forge, 15 miles. The Central of Georgia supplied the rails and materials for which it holds a mortgage. It was alleged that the company had defaulted on the interest.